NETWORK WORLD
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Rate cut for ailing user fuels Tariff 12 questions

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — AT&T last week slashed by 61% the minimum annual charge required in a Tariff 12 deal for Bridgestone/Firestone, Inc. in response to the firm's financial difficulties.

Bridgestone/Firestone, which lost $350 million last year and is $3 billion in debt, has been closing plants and laying off workers. When it was unable to meet its $6.45 million minimum annual charge for its Tariff 12 net, AT&T agreed to change the requirement to a minimum of $2.5 million annually.

The move calls into question whether Tariff 12 deals are really fixed-rate, fixed-term arrangements and undermines AT&T's repeated assertions that it is able to give discounts on the custom networks in part because of long-term customer commitments.

Although users routinely renegotiate Tariff 12s to add services or reduce rates in the packaged deals, such a wholesale remake of a Tariff 12 offering is unprecedented.

AT&T, in fact, emphasized this point in a brief filed last June with

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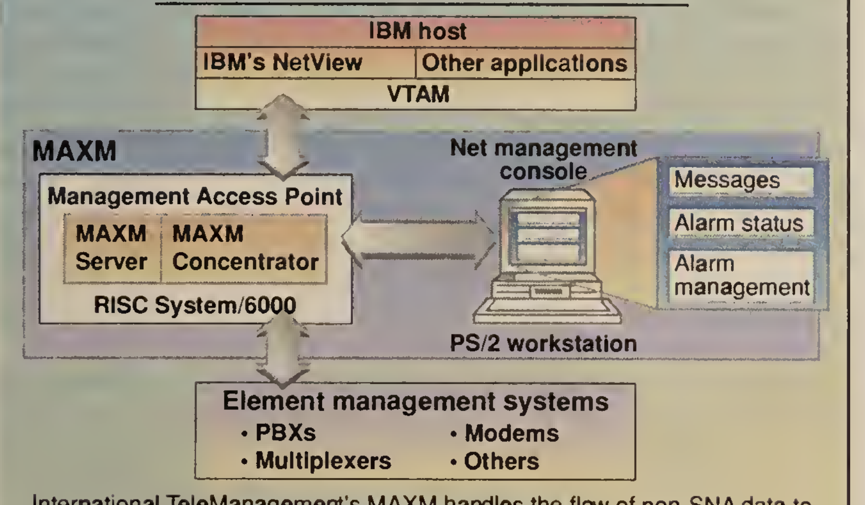
Independent link to NetView



International TeleManagement's MAXM handles the flow of non-SNA data to NetView via a bidirectional link and manages non-SNA devices and element managers independent of NetView.

MAXM = Multivendor Automated eXpert Manager

GRAPHIC BY SUSAN J. CHAMPENY SOURCE: INTERNATIONAL TELEMANAGEMENT CORP., VIENNA, VA.

Process redesign increases return on net investments

By Wayne Eckerson
Senior Editor

Many companies are realizing they can double or triple productivity and cost savings gained through information technology investments by redesigning business processes instead of simply automating existing procedures.

According to Scott Smith, senior manager at Nolan, Norton & Co., a management consulting firm in Lexington, Mass., there are several keys to successfully redesigning business processes. Two of the more important are acquiring top management support and forming a business redesign team comprising individuals from each business function.

Smith also said the process redesign team should set lofty goals in which the new processes yield productivity gains or quality improvements of 40% or higher. New projects typically generate incremental productivity gains of 10% to 15%. "Unless you set high expectations, people won't envision or embrace radically new approaches to carrying out business," he said.

Getting people to break old habits and change the way they conduct business is not easy.

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New SNA tool melds element managers

MAXM system will monitor and control element managers and support two-way link to NetView.

By Paul Desmond
Senior Editor

VIENNA, Va. — IBM business partner International TeleManagement Corp. (ITM) this week will announce an integrated network management system that controls non-SNA management systems or devices and supports a bidirectional link to NetView.

ITM's Multivendor Automated eXpert Management (MAXM) system, based on an IBM RISC System/6000 workstation running AIX, lets users control and collect data from a multitude of attached devices or management systems independently of NetView. It also funnels management data from non-IBM systems to NetView and accepts NetView alarms to be displayed with other management data.

IBM plans to jointly market the product with ITM, fueling speculation that MAXM will spell the demise of IBM's NetView/PC. But IBM and ITM both refuted that claim, saying the two products meet different user needs.

IBM supplied ITM with technical assistance in developing MAXM, particularly for the NetView interface, after ITM in February 1990 announced its intention to build the system, said Craig Thompson, senior vice-president at ITM.

Currently, eight users — including IBM — have installed the

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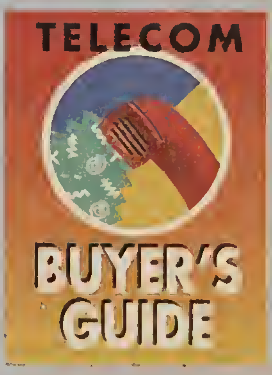
INSIDE



The latest on digital private-line services, page 35.

AT&T unifies Definity line via software

By Bob Wallace
Senior Editor

BRIDGEWATER, N.J. — AT&T last week acknowledged plans to introduce common operating system software for its Definity Generic 1 and Generic 2 digital PBXs and a RISC-based processor that will dramatically increase the call handling capabilities of the switches.

The software, scheduled to be announced within the next 11 months, will enable AT&T's low-end Definity Generic 1 and high-end Generic 2 private branch exchanges to support a single set of calling features and advanced networking functions.

The offering and the new Reduced Instruction Set Computer processor will complete the merging of AT&T's PBX line, which originally consisted of two incompatible PBXs.

"The initial rollout of the Definity in February 1989 represented a pulling together of the

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NETLINE

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IBM TO LICENSE portions of HP's OpenView to form basis of new TCP/IP network management product. Page 3.

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NCR BREAKS INTO imaging market with LAN-based system. Page 8.

NEWSPAPER

FEATURE

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Network World, Bell Labs evaluate SNMP on bridges

By Edwin Mier
Special to Network World

The first results of the *Network World*/AT&T Bell Laboratories Simple Network Management Protocol Test Series are in — and they are encouraging. Despite some problems, the tested equipment worked together using SNMP.

In recent months, scores of vendors have announced or delivered SNMP products. Others have stated their intent to add SNMP support to their existing products. This flurry of activity has turned SNMP into a de facto management standard.

But do all SNMP agents speak the same language? Do they operate as expected? Can they be accessed by different SNMP network management stations? In sum, does SNMP live up to expectations?

In this first test, evaluating the performance of SNMP in

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AT&T offers discounts on international private lines

Says promotion aimed at stimulating demand; competitors criticize move as anticompetitive.

By Barton Crockett
Senior Editor

MORRISTOWN, N.J. — AT&T last week introduced discounts of 25% to 50% for international private-line services that are ordered before July 1.

Although the promotion is intended to attract business during a particularly busy period for ordering international circuits, many AT&T competitors said the action escalates an already intense price war.

While users stand to benefit from the reductions, some carriers expressed concern that the price cuts will eat up slim international private-line profit margins and put small service providers in financial jeopardy.

"There is definitely a price war going on," explained Frank Mancuso, executive director of leased-line services at TRT/FTC Communications, Inc., an international carrier based in New York. "[If it continues] we're going to reach the point where we become like the airlines and prices are so low, people go out of business."

At a minimum, AT&T's promotion is forcing other carriers to respond. Officials at MCI Communications Corp., IDB Communications Group, Inc., TRT/FTC and World Communications, Inc. (WorldCom), for instance, said

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NCUG urges lawmakers to support caller ID services

Group presses for legal mandate on ISDN feature.

By Bob Wallace
Senior Editor

ANN ARBOR, Mich. — The 725-company National Centrex Users Group (NCUG) last week fired off a caller identification position paper to Congress and key policymakers, urging them to propose new legislation supporting the service.

NCUG's effort is the latest in a string of moves by caller ID proponents to press for the creation of legislation that would mandate the controversial service nationwide. Caller ID supporters are frustrated with the process of lobbying for the service on a state-by-state basis.

Companies interested in caller ID, a service that delivers the caller's telephone number to the call recipient, said the absence of a national policy forces them to push for the service with each state's public utility commission (PUC).

Further complicating matters, states that approve telephone company plans to offer caller ID service vary in their decisions on call blocking, which is callers' ability to prevent transmission of their phone number.

"As an avid supporter of caller ID, [I think] a national ruling that favors it would be a godsend and

(continued on page 60)

Provision in bill would let the gov't decode messages

By Barton Crockett
Senior Editor

WASHINGTON, D.C. — A provision in a bill now before Congress is raising a chorus of condemnation from users and experts who say it could seriously erode network security by giving the government the ability to decode encrypted communications.

The provision, part of a counterterrorism bill introduced earlier this year, recommends that carriers and equipment makers provide the government with the means to decode encrypted communications after proper legal authorization is obtained.

The provision does not detail how suppliers would provide such capabilities. But users and security experts said it would probably involve development of electronic trapdoors or master keys that could be used to decrypt data, voice or video communications without a user's permission. Today, messages can only be decrypted by the intended recipient using a decryption key.

Backers of the provision say it will help the government combat terrorist and criminal organizations that are using sophisticated encryption systems.

But users and security experts said passage of the provision

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Briefs

AS/400 to get network makeover. Along with new models of its Application System/400 minicomputer, IBM this week is expected to announce support for its OSI/Communication Subsystem on the OS/400 operating system, as well as File Transfer, Access and Management (FTAM)-based file transfer and X.400 electronic mail software for the AS/400.

According to Frank Dzubeck, president of Communications Network Architects, Inc., a Washington, D.C. consultancy, IBM will also announce new adapters and software that will give the AS/400 native support for Integrated Services Digital Networks. Today, ISDN is supported via an external unit from Teleos Communications, Inc. IBM also plans to offer new software that will beef up the AS/400's role as an application server and will make good on its pledge to support the Common Programming Interface for Communications (CPI-C) on OS/400, Dzubeck said. CPI-C is IBM's strategic application program interface for its LU 6.2/Advanced Program-to-Program Communications session.

Vital financial net goes down. The Society for Worldwide Interbank Financial Telecommunication, S.C. (SWIFT) last week experienced major network outages that disrupted electronic funds transfer at some of the country's largest banks. Because the SWIFT net was down for as long as 5½ hours on Monday, the Federal Reserve Bank of New York and the New York Clearing House Association (NYCHA) were forced to close their Fedwire and Chips funds transfer networks two hours late that day. The SWIFT network is used to initiate payments routed over Fedwire and Chips.

John Lee, president of NYCHA, said SWIFT officials told him the outage occurred in SWIFT's new SWIFT2 system. SWIFT2, which was cut over last year — nearly three years behind schedule — is supposed to be far more reliable than the 14-year-old SWIFT1 network it replaced. A SWIFT spokesman would neither confirm nor deny that the outage occurred in SWIFT2.

Lee said that SWIFT outages of the magnitude experienced last week occur only once a year. He also said the outage may have been long enough to cause banks to incur tens of thousands of dollars in interest penalties for late payments.

Florida PSC rules on caller ID. The Florida Public Service Commission (PSC) last week approved Southern Bell Telephone and Telegraph Co.'s request to offer caller ID service but ordered the telephone company to provide free per-call blocking with the offering. Southern Bell had planned to offer the service without per-call blocking and now says it has not decided if it will pursue its plans to offer the service.

"Southern Bell is disappointed with the PSC's decision," a spokesman for the company said. "We are studying the cost of software modifications as well as what new equipment will be needed to determine whether it would be economically feasible for Southern Bell to offer caller ID in Florida." The PSC also mandated per-line blocking for law enforcement officers, spouse abuse centers and other special services agencies.

IBM to up PS/2 with server models. IBM this week is expected to unveil new models at the high end of its Personal System/2 line that can be positioned as network servers. The models will feature a slower, less costly version of the Intel Corp. 80486 microprocessor than the 25-MHz and 33-MHz 80486 microprocessors that are used in the PS/2 Model 90 and 95. Intel will join IBM at the formal unveiling of its 80486sx chip. The new machines are seen as an attempt to bridge the gap between the popular 80386-based desktop systems and the 80486 models that have been employed largely as servers.

User groups agree to meld profiles. Representatives of the National Institute for Standards and Technology, the North American MAP/TOP Users Group and the Electric Power Research Institute met last week in San Francisco and agreed that there is significant commonality among their Open Systems Interconnection profiles to warrant creating a unified OSI document. Pending approval from their constituencies, the representatives said they would begin hammering out a common profile next fall. The final document will specify OSI standards common to Manufacturing Automation Protocol/Technical and Office Protocol, Government OSI Profile and the Utility Communications Architecture OSI profiles.

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IBM licenses HP's OpenView to offer TCP/IP net control

By Paul Desmond
Senior Editor

NEW YORK — IBM last week announced it will license portions of Hewlett-Packard Co.'s OpenView network management system to create a new IBM product for managing TCP/IP networks.

The announcement means HP gets another platform — the IBM RISC System/6000 under AIX — on which to run OpenView, in addition to the DOS and two other Unix implementations it already offers. Also, IBM gets one of the premier systems for managing multivendor devices on Transmission Control Protocol/Internet Protocol networks.

In addition, users get another choice for how to manage campus or single-site environments and a potential wealth of new management applications if third parties embrace OpenView as HP and IBM hope they will.

The announcement blossomed from work the companies have done on a joint submission to the Open Software Foundation (OSF) to have their network and systems management technology adopted as the basis for the OSF's Distributed Management Environment. That submission has been endorsed by Siemens Nixdorf Informationssysteme AG and Groupe Bull SA.

"As IBM was evaluating its own requirements for an AIX-based management system, it was a natural next step to take a closer look at the OpenView products themselves," said Bill Warner, director of network management in IBM's Communication Systems division.

Warner said IBM will license two OpenView components. One is the OpenView Network Node Manager, which uses the Simple Network Management Protocol to let users configure, troubleshoot and monitor the performance of TCP/IP nodes from a single workstation.

The other is the OpenView Network Management Server, which supports communications among distributed Network Node Managers and integrates information from the different management applications it runs. The server also supports SNMP and CMOT, which is an implementation of the OSI Common Management Information Protocol (CMIP) over TCP/IP networks.

HP and IBM, have promised to support CMIP and Common Management Information Services (CMIS) in future products.

IBM already has its own AIX Network Management/6000 (NM/6000) product for managing TCP/IP nets, said Sanjiv Ahuja, manager of AIX network management services in IBM's Communication Systems division. NM/6000 can manage any device that supports SNMP, send alert data to NetView and exchange files with a host via the NetView Distribution Manager.

Most, if not all, of that func-

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Corrections: The chart running with the story "NATA group to form PBX-to-host specs" (*NW,* April 1) omitted AT&T from a group of PBX manufacturers participating in the new task force described in the story.

The People & Positions column in the Industry section of the April 8 issue incorrectly stated Stephen Cheheyl's new title at Wellfleet Communications, Inc. Cheheyl was actually named senior vice-president of finance and administration, as well as chief financial officer.

The number to call for more information about Ian Angus' new book, *ISDN: A Manager's Guide to Today's Revolution in Business Telecommunications,* was incorrect. The correct number is (416) 420-5050.

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IBM fires up promotion with new version of OS/2

Plans campaign to challenge Window's success.

By Eric Smalley
Senior Editor

NEW YORK — In an effort to boost user confidence in OS/2, IBM last week demonstrated here an unreleased version of the operating system that can run unmodified DOS and Microsoft Corp. Windows applications and also announced price cuts for the current version of the software.

At briefings here, IBM launched an OS/2 marketing campaign. The campaign is in response to Windows 3.0, a graphical extension to the DOS operating system whose rapid success threatens the already slow acceptance of OS/2.

At the briefings, IBM showed off OS/2 Version 2.0, a 32-bit multitasking operating system that offers performance improvements of as much as 40% over the 16-bit OS/2 Version 1.3, said Lee Reiswig, assistant general manager of programming for IBM's Personal Systems Group.

OS/2 Version 2.0 is due out by the end of this year.

IBM executives described OS/2 Version 2.0 as an integrating platform because it can run DOS, Windows 3.0 and 16-bit OS/2 applications unmodified. Users can run the different applications simultaneously and can cut and paste between them.

OS/2 Version 2.0 includes a user shell with a desk metaphor that provides Windows-like features.

Lower price

The new version of the operating system will cost less than $200, according to Joe Guglielmi, an IBM vice-president.

IBM also reduced the price of OS/2 1.3 Standard Edition from $340 to $150 and OS/2 1.3 Extended Edition from $830 to $690. DOS users can upgrade to OS/2 1.3 Standard Edition for $99 and OS/2 1.3 Extended Edition for $635.

Users that purchase either version of OS/2 1.3 before the end of the year will be able to upgrade to OS/2 Version 2.0 at no additional cost.

Unbundling

IBM said it will also unbundle some key OS/2 Extended Edition components. The components, which will be available separately later this year, include the LAN Requester, Communications Manager and Database Manager.

These components can be run with OS/2 Standard Edition on Intel Corp. 80386- and 80486-based personal computers from vendors other than IBM. Currently, the components are available only with IBM's OS/2 Extended Edition, which runs on IBM's Personal System/2 series.

In addition to demonstrating OS/2 2.0, IBM executives reiterated some key local-area networking plans.

As part of its effort to integrate Novell, Inc.'s NetWare into its environment, IBM said it will work to enable NetWare Internetwork Packet Exchange/Sequenced Packet Exchange (IPX/SPX) packets to be transported across Systems Network Architecture networks.

IBM will also provide NetWare client systems with access to

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3Com packs let PC users access OSI

By Caryn Gillooly
Senior Editor

SANTA CLARA, Calif. — 3Com Corp. last week brought out three products that will help users of personal computers and terminals access Open Systems Interconnection-based systems.

The first two software packages — 3Com OSI/End Systems (ES) with Demand Protocol Architecture (DPA) and 3Com OSI InternetBIOS — are for personal computer users. The third product, Transmission Control Protocol/Internet Protocol and OSI Connection Service software, is for 3Com's CS line of terminal servers.

3Com OSI/ES with DPA lets a single MS-DOS user transfer to and retrieve files from OSI-based hosts using the OSI File Transfer, Access and Management (FTAM) specification. The software will be supported under 3Com's DPA architecture, which enables users to load different protocols as needed to communicate with other systems.

Once 3Com OSI/ES is loaded, the MS-DOS machine can send files to and retrieve them from any other system supporting FTAM.

Hosts, however, cannot access files on the personal computer because with OSI, there is a "responder," or server, and an "initiator," or client. 3Com's product only includes the client side.

Other companies, such as Digital Equipment Corp., Hewlett-Packard Co. and Retix, offer client/server packages in which software is installed on the machines that will be exchanging files, allowing the host to access the client and vice versa. Still others offer client software for Unix-based workstations.

But according to 3Com, no other company offers a shrink-wrapped off-the-shelf product that lets MS-DOS personal computers connect with OSI-based hosts.

"This offers generic OSI services on a [personal computer] as an end-user product, and that's a first," said Michael Smith, product manager for protocols at 3Com, based here.

3Com's OSI InternetBIOS lets

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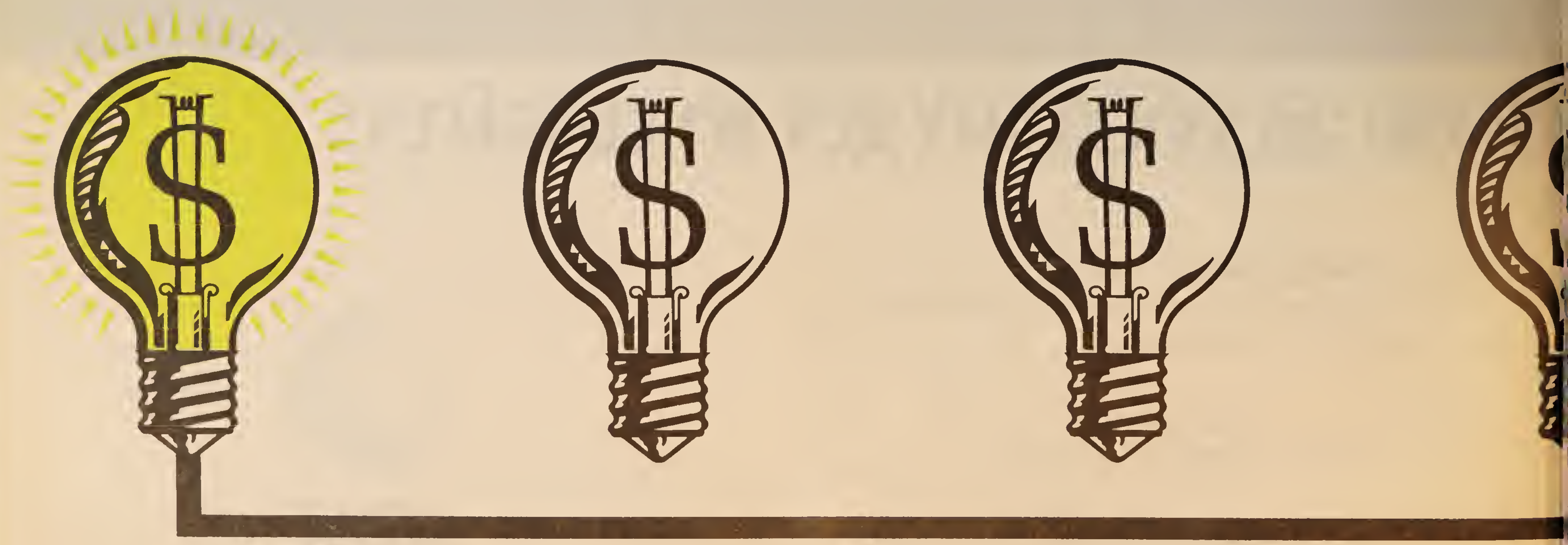

GSA owns up to irregular deals in FTS 2000 contract

By Ellen Messmer
Washington Correspondent

WASHINGTON, D.C. — At a hearing last week on Capitol Hill, General Services Administration officials failed to stave off congressional charges that the agency has mismanaged Federal Telecommunications System (FTS) 2000, the federal long-haul net.

Under questioning from John Conyers Jr., chairman of the House Committee on Government Operations, top GSA officials not only acknowledged contract irregularities with US Sprint Communications Co., but said the carrier had threatened to pull out of FTS 2000 unless specific demands were met.

House officials suspended the hearing due to time constraints before scheduled US Sprint and AT&T testimony could be heard. But separately, US Sprint Chairman and Chief Executive Officer William Esrey firmly rebutted the GSA's allegations. "There is absolutely no truth about wanting to bail out of FTS 2000," Esrey said.

Carol Hall, GSA's FTS 2000 contracting officer, told the congressional committee that last September, Gary Forsee, then president of US Sprint's Government Systems Division, had reacted angrily to a GSA letter demanding a refund because the carrier had overbilled the government by $706,000 in February 1990. Forsee, now president of US Sprint's Business Services Group in Kansas City, Mo., was unavailable for comment at deadline.

Under an FTS 2000 contract clause, AT&T and US Sprint must lower their FTS 2000 switched voice service rates to meet their best respective commercial prices. A similar GSA letter to AT&T informed that company of $167,000 in February 1990 overcharges and demanded a refund.

"Forsee threatened to take GSA to court. He denigrated GSA [and] he criticized [GSA Assistant Commissioner] Mike Corrigan for saying FTS 2000 prices were too high," Hall testified. Finally, Hall said, Forsee told her US Sprint would pull out of FTS 2000 unless the GSA letter was withdrawn.

On the same day of the phone call with Forsee, Hall said, she withdrew and suspended the letter listing the overcharges in order to conduct new negotiations with US Sprint. GSA also subsequently withdrew the AT&T letter as well.

During her testimony, Hall admitted that she and US Sprint officials conducted secret negotiations that resulted in a memo of understanding on Oct. 15 in which GSA agreed to assign US Sprint $20 million worth of business from a certain agency in return for a $40 million volume discount on services. Hall admitted she never recorded a price negotiation memo on the deal.

But as part of the agreement, US Sprint asked for — and received — a portion of the FTS 2000 contract for the U.S. Department of the Navy, over protests from AT&T, which originally held the Navy's business.

Corrigan told Congress the Navy contract was worth "somewhere between $20 million and $150 million" over the life of the 10-year contract.

Milton Socolar, special assis-

(continued on page 63)

DEC package enables VAX to support voice programs

Integrates voice and data on common platform.

By Jim Brown
Senior Editor

MAYNARD, Mass. — Digital Equipment Corp. this week will introduce hardware and third-party software that enable users to support voice mail and voice response applications on VAXes.

DEC will also release specifications that define how digitized speech can be stored on a VAX as an RMS data file under the company's Compound Document Architecture (CDA), making it possible to append voice messages to a report containing other CDA elements, including text, graphics and images.

Users and analysts gave DEC credit for attempting to integrate multiple voice applications on a single processor, an emerging trend in the voice processing market.

"Most large companies, if they have any brains at all, are trying to migrate [from having] a bunch of stand-alone voice processing systems down to one or two," said the voice processing manager for a large East Coast chemical and engineering firm that is preparing to test DEC's offering and who requested anonymity. "So why wouldn't we want to run our voice applications on the same platform as all of our other distributed processing applications?"

Migrating applications from stand-alone systems to a VAX managed by existing operations staff obviates the need to hire specially trained staff to run proprietary voice processors, the manager said. It will also enable digitized voice to be transferred between VAXes over the company's DECnet network, eliminating the need to establish separate links for that purpose.

At the heart of the announcement will be a DEC-developed T-1 VAX interface and a voice processing board that is more powerful than the company's currently available product. Both boards

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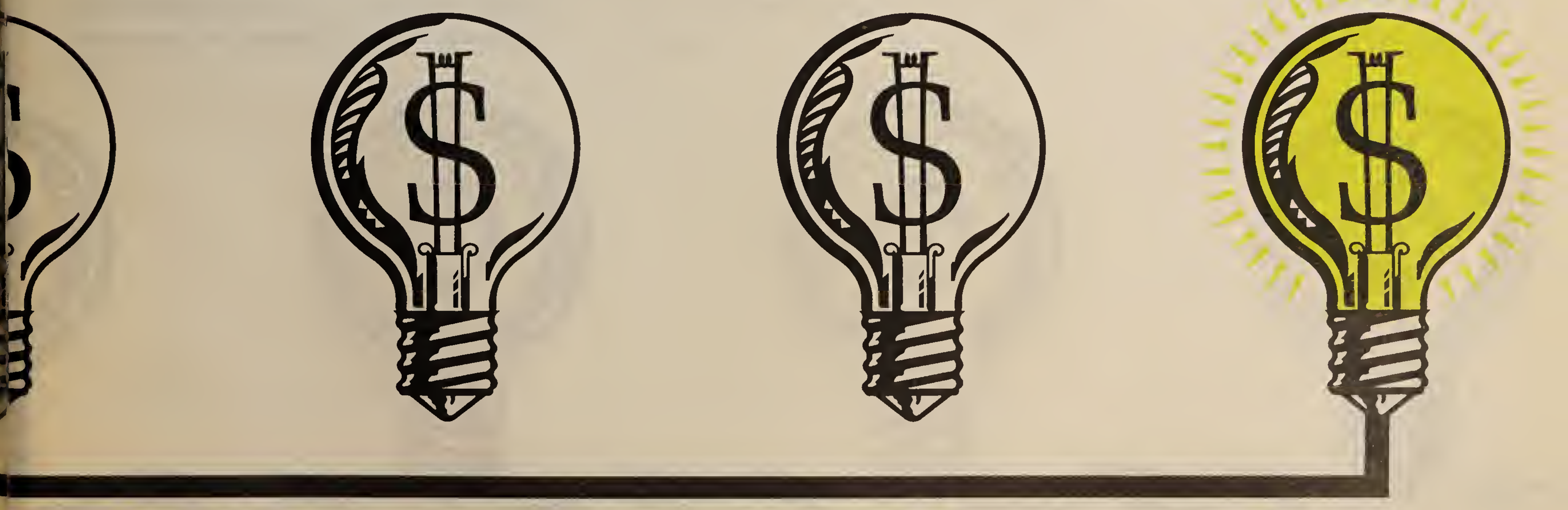

NCR serves up LAN-based entrant to imaging market

By Maureen Molloy
Staff Writer

DAYTON, Ohio — NCR Corp. last week entered the imaging market with a local-area network-based system that features advanced character recognition and the ability to control the flow of image documents across an organization.

NCR's Document Management System (DMS) allows customers to use standard LAN-attached microcomputers instead of proprietary image workstations to access image files on a Unix server.

DMS consists of client/server software running on the company's System 3000 Unix servers connected to image-capable personal computers on a token ring or Ethernet supporting LAN Manager/X, NCR's Unix version of Microsoft Corp.'s operating system. Client software on the LAN workstations request files stored on the image server. The LAN supports Network Basic I/O System and Transmission Control Protocol/Internet Protocols.

On top of that, users can run a variety of image applications, including character recognition for scanning documents into the system, relational data base software and facsimile services.

"What users will find appealing is that DMS is a common software architecture and data base that can operate on the workstation, the server or the mainframe," said Len McCarthy, director of Imagine, Inc., a Watertown, Mass.-based consultancy.

NCR DMS is based on the company's Open Cooperative Computing Architecture (OCCA), which sets the guidelines for building client/server applications that will run across NCR's and other firms' hardware lines.

Bruce Silver, director of image management systems at the Norwell, Mass.-based consultancy BIS Strategic Decisions, said the NCR imaging system will be attractive to many users because it includes two key tools lacking in other vendors' imaging systems.

One is the software's Workflow Manager, an automation tool that allows an organization to model work loads and determine how to distribute incoming image files to clerks or other end users. Using the feature, network personnel can program the image server to route files to specific individuals in a group or to process a request for a credit or mortgage application.

Another strong selling point, Silver said, is DMS' sophisticated character recognition technology, which extends beyond the typical range of printed and typewritten fonts to include hand-printed numbers.

"Users have been crying out for an imaging application that integrates the whole variety of characters you find in real-world documents, and NCR is the first to respond to that need," Silver said.

NCR is marketing DMS in full system configurations, including scanners, high-resolution displays, servers, workstations, optical storage devices and laser printers. Pricing ranges from about $800,000 for a standard 20-workstation system to $3.5 million for a 120-workstation system.

The vendor is expected to ship NCR DMS in limited quantities this July, with general availability slated for next fall.

IBM licenses HP's OpenView

continued from page 3

tion will be ported to the OpenView-based product, which IBM plans to sell under its NetView umbrella, Warner said. OpenView includes more sophisticated functions, such as a discovery application that automatically determines the network's topology.

Once ported to OpenView, NM/6000 functions could be integrated with other applications that IBM and HP each expect to roll out, as well as products produced by third-party equipment vendors and independent software developers.

The agreement will spur third-party application development because OpenView gives developers a common set of application program interfaces that they can use to write applications. These applications can then run on the various computing platforms that support OpenView, said Jeff Thiemann, OpenView market development manager in HP's Colorado Networks Division.

OpenView currently runs on DOS, HP's UX version of Unix and Sun Microsystems, Inc.'s OS Unix version.

Analyst reaction to the announcement was mixed. Some said IBM is merely taking advantage of the work it has already done with HP for their OSF submission and is acquiring a more sophisticated management system for TCP/IP networks.

Others said the move could mark the beginning of a migration from mainframe- to workstation-based management systems.

"All of the modern approaches to network management are based on distributed management architectures," said James Herman, a principal with Northeast Consulting Resources, Inc. in Boston. "IBM is recognizing they need that approach as well."

Herman said the distributed approach will become even more important as users implement IBM's Advanced Peer-to-Peer Networking, which is a departure from the traditional hierarchical structure of Systems Network Architecture.

Lloyd Taylor, telecommunications network manager at Johns Hopkins University and a TCP/IP and IBM user, said, "We're very interested in seeing what they actually deliver."

IBM gave no specific time frame for when it would announce or deliver a product based on OpenView.

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Circle Reader Service #109

AT&T cuts rate for Tariff 12

continued from page 1

a federal appeals court examining the Federal Communications Commission's decision to allow Tariff 12. "Contrary to [opponents'] assertions, the minimum annual commitments have in fact been immutable in practice," AT&T's brief stated. "Whereas AT&T has renegotiated or revised individual options when users wanted to increase the minimum annual commitments, AT&T has not allowed customers to reduce their overall commitments."

Since that brief was filed, AT&T has reduced the minimum annual charge in at least one other case, a small decrease of $387,000. The carrier has also allowed customers that outgrew or were dissatisfied with their Tariff 12 deals to sign new deals.

An AT&T spokeswoman said its renegotiation with Bridgestone/Firestone was so sensitive that the carrier would not comment beyond the statement in its filing. In that statement, AT&T said, "The customer will be unable to meet its minimum annual commitment as a result of its severe business difficulties." Bridgestone/Firestone could not be reached for comment.

Observers last week questioned whether AT&T's decision to scale down Bridgestone/Firestone's deal would set off a rash of other companies wanting to restructure deals.

James Blaszak, a telecommunications attorney in Washington, D.C. who counsels large users about Tariff 12 deals, said it is too early to tell. "There is that temptation, but just because a company is having lean times doesn't mean it will cut back on telecommunications," he said.

The way AT&T prices its custom packages of voice and data services has come under scrutiny during legal wrangling over the deals. Opponents say Tariff 12 deals are nothing more than vehicles to offer discounts to large customers for existing services.

AT&T has contended that Tariff 12 deals are integrated offerings of inbound, outbound and data communications services that are different from any one of the component services. One way AT&T has justified charging less for these packages by saying that customers give up significant control over the exact engineering of the network, which leaves the carrier free to maximize efficiency and cut costs.

But another justification for Tariff 12 discounts has been that by committing to such long-term deals and stable rates, users reduce the carrier's risk and enable AT&T to offer price reductions.

"Aside from provisioning flexibility, the major difference between [Tariff 12] and other AT&T services is that with [Tariff 12], the user has provided AT&T with a projection of its traffic volumes and patterns for a fixed period of time and has committed to a minimum charge for that period, which in effect guarantees those projections," AT&T told the FCC in one of the original documents it filed to defend Tariff 12.

> AT&T has also allowed users that outgrew Tariff 12s to sign new deals.
>
> ▲▲▲

In its Tariff 12 order and again in a brief submitted to a federal appeals court attempting to justify its decision to allow Tariff 12, the FCC relied on AT&T's arguments that contractual differences distinguish Tariff 12 deals and make discounts possible.

"It is often cheaper to produce a large quantity at a continuous rate than to produce smaller lots at varying rates," the FCC said in its Tariff 12 order. "Package offerings, by combining a mutual commitment to a specified volume and level of service, offer both the possibility of cost reductions from providing the more stable set of outputs as well as the additional value, which the package may provide the customer."

Based on the FCC's and AT&T's assertions, it is logical to expect that a sharp reduction in Bridgestone/Firestone's traffic volume commitment would yield higher prices.

But Bridgestone/Firestone's new deal increases prices only slightly for on-net calls placed during business hours. Under the original rate schedule, calls up to 292 miles cost 6.3 cents per minute, compared with 6.37 cents per minute under the new rates. Costs for longer distance calls increased from 13.4 cents per minute to 13.7 cents per minute for business hour traffic.

Rate increases for off-net calls increased more, with new rates set almost one cent per minute higher. For calls up to 292 miles, AT&T originally charged 14.5 cents per minute during business hours; the same call will now cost 15.4 cents per minute.

For longer distance calls, the increases were similar. Calls between 1,911 and 3,000 miles were originally priced at 19.6 cents per minute during business hours and will now cost 20.4 cents per minute. Data service rates are not listed in the tariff.

AT&T told the FCC it is not expecting significantly more revenue under the restructured Bridgestone/Firestone deal. Originally, AT&T said that, based on the minimum annual charges, it would make a profit of $730,000 over the three years of the deal. Now AT&T said it will make $790,000.

In order to protect themselves from business slowdowns, most users set their minimum annual charge commitment well below their anticipated traffic levels. Thus, AT&T always provides a second set of revenue estimates based on projected demand.

Initially, AT&T expected to receive $1.03 million based on projected demand over the three-year deal; now it said it expects to receive $2.27 million. ◻

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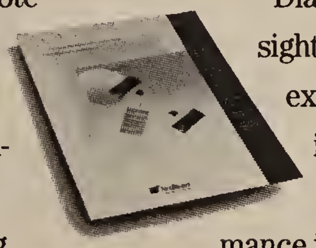

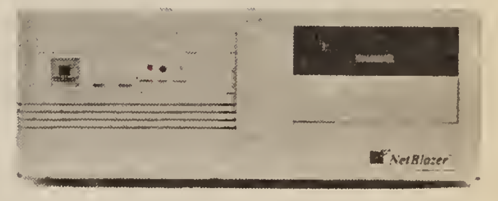

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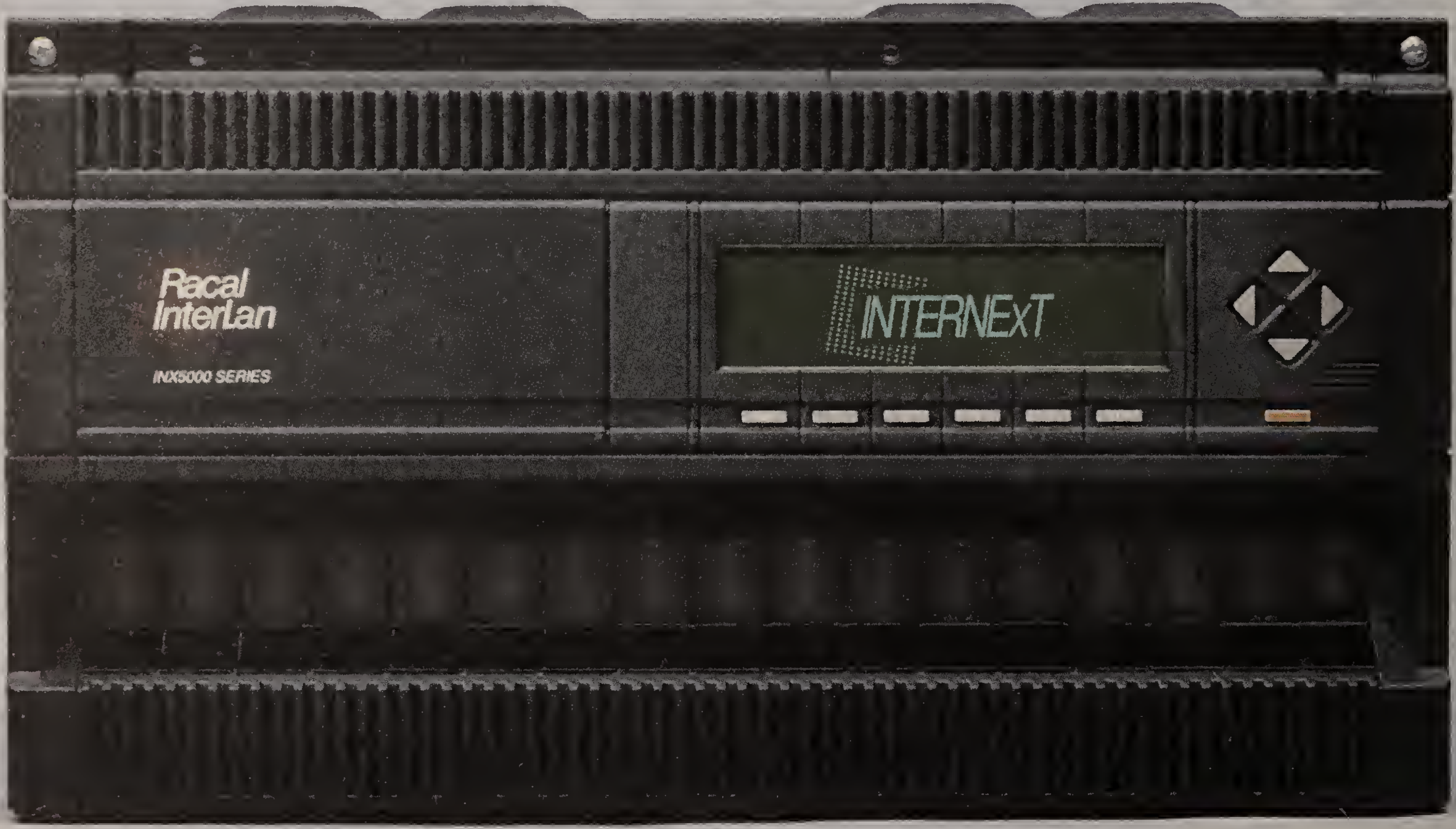

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INDUSTRY UPDATE

VENDOR STRATEGIES, MARKET TRENDS AND FINANCIALS

Worth Noting

> "The issue of local exchange carrier access charges is going to be the biggest telecommunications story of 1991."
>
> **Peter Bernstein**
> Vice-president
> Probe Research, Inc.
> Cedar Knolls, N.J.

People & Positions

Tektronix, Inc. last week said it has promoted **Stephen King** to director of marketing for the company's Network Display Division.

King formerly served as marketing manager for the unit but assumed the role when Kevin Cornelius vacated the post for an assignment in the company's Computer Graphics Group.

King has held a number of senior-level management positions in marketing of the firm's terminals and workstations.

The Network Displays Division develops and markets graphics terminals and X Window System terminals.

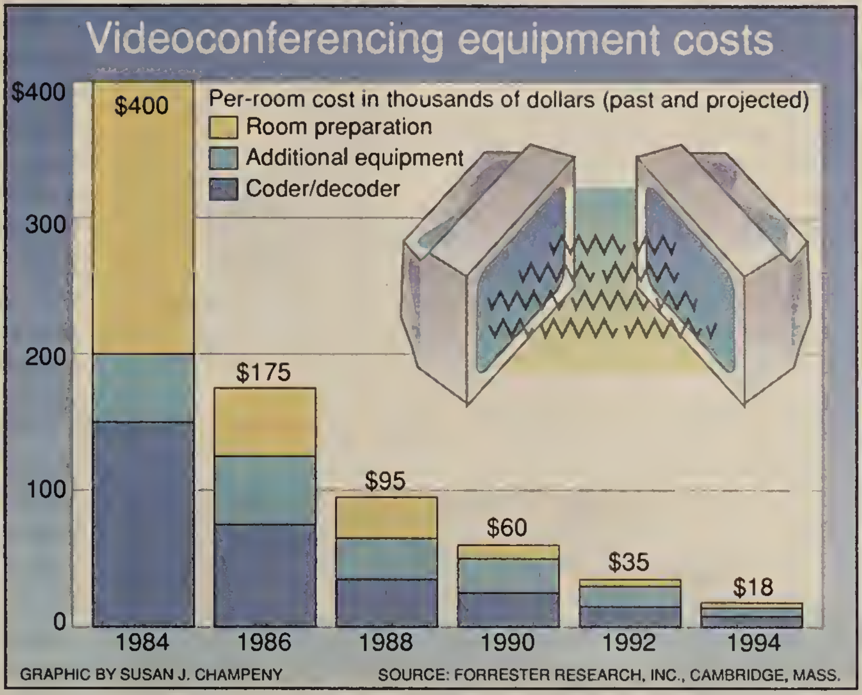
Netrix Corp. last week said it has elected **V. Orville Wright** to its board of directors. Wright is currently vice-chairman of MCI Communications Corp.

With more than 40 years of experience in high-technology companies — including IBM, RCA Corp. and Xerox Corp. — Wright hopes to contribute to product development and marketing activities.

Tigon Corp. recently said **Ward Flora** has joined the company as vice-president of interactive voice response.

Flora most recently served as general manager of GTE TeleMessager, a voice-messaging service company Tigon acquired in January.

Flora is credited with developing an interactive voice response system at GTE TeleMessager and had a hand in implementing GTE's internal voice mail network.


Videoconferencing equipment costs

GRAPHIC BY SUSAN J. CHAMPENY SOURCE: FORRESTER RESEARCH, INC., CAMBRIDGE, MASS.

Study says costs may limit use of videoconferencing

Widespread acceptance may take 3 to 4 years.

By Bob Brown
Senior Editor

CAMBRIDGE, Mass. — A new study predicts that videoconferencing will not gain widespread user acceptance for another three years due to high equipment costs, picture quality issues and a lack of sufficient high-speed switched digital services.

"Videoconferencing vendors claim the planets have aligned and that it's finally time for the market to explode," said Janet Hyland, author of Forrester Research, Inc.'s "Videoconferencing" report. "But if you take a harsh look at the realities, it's obvious it will be another three or four years before everything lines up. It doesn't make sense to jump headlong into videoconferencing at today's prices."

> "The best meetings for videoconferencing are routine, internal meetings where people already know each other," Hyland said.
>
> ▲▲▲

Hyland acknowledged, however, that there is a long list of factors that has buoyed the hopes of videoconferencing vendors. Bandwidth requirements have been squeezed down to 112K bit/sec, audio compression techniques have improved sound quality and portable systems have made the technology more flexible, she said.

According to the report, three videoconferencing markets will emerge: videoconferencing systems for group meetings, video telephones and desktop videoconferencing based on personal computers or workstations.

The only market Forrester sees blossoming is group systems. A majority of Fortune 1,000 firms will have installed videoconferencing systems by 1995 to offset business travel expenses and save "wear and tear" on employees, the report stated.

Need to smell and touch

"The best meetings for videoconferencing are routine, internal meetings where people already know each other," Hyland said. "Otherwise, people still need to smell and touch each other."

Once videoconferencing systems are generally available for $15,000 and less, and switched 56K bit/sec services are available at good prices — probably by about mid-decade — the market for group videoconferencing systems will enter a phase of strong growth, the report said.

Forrester predicted in the report that videophones, on the other hand, will be "a monumental flop." Videophones are expected to debut at $1,500 in 1992, a price most users won't be willing to pay, the report stated.

Personal computer or workstation videoconferencing also faces obstacles, such as the need for 100M bit/sec Fiber Distributed Data Interface-type bandwidth to support such applications, the report stated. The only logical candidates for this type of videoconferencing will be companies in such fields as health care that demand full-motion video.

Debate heats up over local access pricing

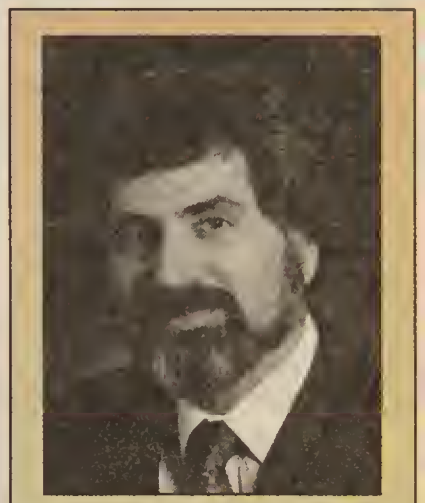
Carriers split over freedom LECs should have to charge for local portion of switched interstate call.

**By Bob Brown
and Ellen Messmer**
Network World Staff

WASHINGTON, D.C. — A major battle is shaping up in the telecommunications industry over how much pricing flexibility local telephone carriers should be permitted when charging long-haul carriers for origination and termination of switched interstate traffic.

The impending expiration on Sept. 1 of a provision in the Modified Final Judgment requiring local carriers to charge all long-haul carriers a uniform per-minute fee for local transport of interstate traffic could have far-reaching effects on competition in both the local and long-distance markets, observers said.

The regional Bell holding companies and AT&T have argued for new rate rules to spur competition in both the local and long-haul markets. But alternative access carriers and smaller second-tier long-haul carriers countered that liberalizing the fee structure would give the RBHCs and AT&T a competitive advantage that could stifle competition.


"The issue is whether 'equal charge per unit' has outlived its usefulness."
Paul Malandrakis, AT&T

The Federal Communications Commission issued a request for information (RFI) last January to solicit comments on how the rules governing local transport charges should be set up for the future, given that the industry has changed drastically since the

(continued on page 12)

INDUSTRY BRIEFS

NCR revenue up, earnings down. NCR Corp. last week reported first-quarter revenue of $1.36 billion, up 8% from $1.26 billion in the first quarter of 1990. Strong revenue overseas, particularly in the Pacific region, served to offset a decline in U.S. revenue during the quarter.

NCR's earnings for the first quarter fell to $46 million, down 12% from $52 million in the first quarter last year. NCR's earnings were negatively affected by $7 million in special charges related to fighting AT&T's hostile takeover attempt.

3Com to sustain work group business. 3Com Corp. recently announced it will sustain operations of its work group systems division, which the company has been trying to sell since January.

3Com previously announced plans to sell the work group systems division, which includes network servers and terminals, as part of a corporate strategy to refocus on global data networking products such as network adapter cards, internetworking devices and terminals servers. But the company has yet to receive an adequate offer for the work group systems division, according to Eric Benhamou, 3Com's president and chief executive officer.

Goldstar to resell FiberCom gear. FiberCom, Inc. last week said it has signed a two-year agreement with Goldstar Cable Company, Ltd. under which Goldstar will resell FiberCom Fiber Distributed Data Interface products in South Korea.

The agreement, which gives Goldstar the exclusive rights to sell FiberCom products in that country, covers FiberCom's entire product line aside from channel extenders.

Debate heats up over local access pricing

continued from page 11

Modified Final Judgment provisions were adopted in 1983.

In the early 1980s, the FCC adopted a cost-based formula in its Part 69 rate rules for provisioning dedicated and common transport facilities to handle the local portion of long-haul traffic. Dedicated facilities provided transport between an interexchange carrier's point of presence (POP) — such as AT&T's — and the local exchange carrier switching office closest to the call origination or destination point. Common transport refers to the sharing by several interexchange carriers of a connection between one or more local exchange carrier tandem switches and the local carrier office closest to the call origination or destination point. Under the latter setup, carriers would incur greater usage- and distance-sensitive charges.

But the FCC waived its Part 69 rate formula in the early 1980s to yield to the Consent Decree's rate provisions. The Modified Final Judgment pricing rules now in place were designed to cushion rates for small interexchange carriers in order to spur competition with AT&T.

Under the Modified Final Judgment's "equal per unit" rate requirement, the costs for dedicated facilities and common transport are averaged so that each interexchange carrier pays the same usage cost, regardless of how data is passed between the long-haul carrier's point of presence and the local carrier's central office. This rate setup was instituted to negate any edge AT&T had via dedicated transport.

"The FCC should not allow RBHC claims about competition to be a factor in their decision on [whether to change the rules for local access pricing]."
Robert Atkinson,
Teleport Communications Group

The RBHCs have responded to the FCC RFI on transport charges in near unison, requesting a move to drop averaged rates in favor of a relaxed rate formula, although unlike AT&T, the RBHCs have not come out directly in favor of the cost-based pricing supported in the FCC's old Part 69 rules. The RBHCs argue that competition with alternative local carriers over transport charges will give them more incentive to bolster access services with advanced technology.

"The current rate structure was appropriate when it was put into effect, but it is inappropriate for today's telecommunications environment," said Whit Jordan, director of federal regulatory at BellSouth Corp. in Washington, D.C. "Now there is competition in the local network, and we have different signaling capabilities than we did back then. The commission needs to make a complete review of this."

AT&T maintained it would save $400 million in annual access charges under the old FCC rules because of the high traffic volume it carries and the proximity of its points of presence to RBHC switching offices. The carrier said users would benefit from the savings passed on to them by it and other carriers.

"The issue is whether 'equal charge per unit' has outlived its usefulness," said Paul Malandrakis, AT&T division manager in government affairs.

Local bypass carriers and other long-haul carriers strongly disagreed. They countered that granting the RBHCs more pricing flexibility will hurt competition, and US Sprint Communications Co. said AT&T's competitors will be driven out of business.

Bypass carriers, represented by the Association for Local Telecommunications Services, said in their filings that the RBHCs have overstated the amount of competition they face from alternative service providers.

"What competition?" asked Robert Atkinson, senior vice-president of regulatory affairs at Teleport Communications Group, a New York-based alternative access carrier. "The FCC should not allow RBHC claims about competition to be a factor in their decision on this."

The Competitive Telecommunications Association (COMPTEL), which represents long-haul carriers other than the Big Three, argued that AT&T, with more points of presence and larger traffic volumes than its rivals, would be the only beneficiary of cost-based pricing.

In its FCC filing, COMPTEL stated, "AT&T's access costs would drop by substantial measure, while that of its rivals would increase precipitously. Under these circumstances, meaningful long-distance competition immediately would become impossible in all but the larger markets."

AT&T's Malandrakis said more efficient network planning and traffic pooling among smaller carriers could offset any disadvantage stemming from their size.

The FCC is being urged by user groups such as the Ad Hoc Telecommunications Users Group and the International Communications Association (ICA) to proceed cautiously lest the commission creates turmoil in the interexchange market.

The ICA proposed that the FCC issue a

(continued on page 60)

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Worth Noting

> "Managing a constantly changing voice mail network is fairly frustrating today because of the lack of network management tools."
>
> **Robert Nacon**
> RJN Associates
> Roswell, Ga.

Carrier Watch

US Sprint Communications Co. and Teleos Communications, Inc. last week announced an agreement to form a joint sales and marketing alliance.

Under the agreement, US Sprint's sales force will sell Teleos products with the carrier's network services, while Teleos' sales group will sell US Sprint network services with its customer premises equipment.

Teleos, based in Eatontown, N.J., manufactures Integrated Services Digital Network equipment supporting local-area network interconnection and videoconferencing applications. The company also makes ISDN interfaces for private branch exchanges, computers and T-1 multiplexers.

In addition, the two companies will team to address customers' ISDN needs. US Sprint and Teleos will develop joint submissions in response to user requests for proposal.

Southwestern Bell Telephone Co. last week asked the Texas Public Utility Commission for approval to offer long-term customer-specific Centrex contracts to midsize businesses with 75 to 200 telephones.

If approved, the Bell operating company will be able to offer its Plexar Centrex service at off-tariff prices tailored to the needs of smaller companies. Southwestern Bell currently offers fixed-price or customer-specific contracts to businesses with more than 200 lines. ◘

Row over broadcast rules causes concern about FCC

Congress questions agency's ability to function.

By Anita Taff
Washington Bureau Chief

WASHINGTON, D.C. — At a recent hearing on FCC funding, key lawmakers expressed concern about the commission's handling of a major broadcasting decision and raised doubts about its ability to decide on a number of important telecommunications matters.

Congressmen chastised the Federal Communications Commission for relaxing the 20-year-old rules that dictate whether television networks or studios reap the billions of dollars in profits from the syndication of television shows.

The FCC proceeding generated rumors of political squabbling within the agency, allegations of conflicts of interest and a mutiny of sorts when three commissioners proposed and approved the changes despite FCC Chairman Alfred Sikes' vocal opposition. There was also heavy lobbying from industry representatives.

During an appropriations hearing on funding for the FCC for the next two years, several congressmen said the commission's syndication decision may have been less than objective and independent. They questioned whether FCC commissioners had adequately justified the move and whether the agency followed proper procedures.

Some lawmakers also pondered whether the battle over the syndication rules had so bloodied the FCC's five commissioners that it will be difficult for them to cooperate on major telecommunications issues currently pending. Those issues include the agency's reinvestigation of AT&T's Tariff 12, an examination of AT&T's dominance in the long-distance marketplace and the possible shifting of oversight for the Modified Final Judgment from the courts to the FCC.

The syndication issue marked the first major rift between the FCC and Congress since Sikes became chairman. Although lawmakers have disagreed with past FCC decisions, they have never raised such strong questions about the agency's integrity.

In an unusual appearance before the Subcommittee on Telecommunications and Finance, Rep. John Dingell (D-Mich.), chairman of the parent Committee on Energy and Commerce, criticized the FCC's handling of the syndication issue.

"The residue from this proceeding has the potential to poi-

(continued on page 26)

WASHINGTON UPDATE

BY ANITA TAFF

AT&T defers effective date of latest Tariff 15. Under protest, AT&T last week deferred the effective date of its 16th Tariff 15 deal, this one for Siebe, Inc.

The Federal Communications Commission said it needed more time to study the deal, which will give Siebe a 2% discount off total monthly charges for a Software-Defined Network Service Expanded Volume Plan. The commission indicated that it wants 120 days, the maximum time allowed, to examine the offer.

Previously, the FCC had only 90 days to examine a tariff without taking official action. But Congress last year granted the agency permission to take as long as 120 days. AT&T last week filed documents agreeing to defer its offer for that length of time but did so under protest.

"AT&T makes this filing notwithstanding its view that deferral of [its offer] for 120 days cannot be squared with Congress' explanation of the purpose of the 1990 revisions to the Communications Act [of 1934]," stated AT&T in its filing.

Tariff 15 has been extremely controversial because it singles out certain customers for discounts. Opponents claim this violates provisions of the Communications Act that forbid carriers from discriminating among customers.

The FCC has allowed some Tariff 15 offers to take effect but has yet to issue a ruling on whether the custom network deals are legal. ◘

Voice response equipment market ascends

Year	Total revenues (in millions of dollars)	Percentage growth
1985	$52.0	—
1986	$87.0	47.8%
1987	$125.5	53.7%
1988	$181.0	42.8%
1989	$282.5	51.5%
1990	$339.8	23.7%
1991	$405.8	17.8%*

About 8% of voice response unit sales in 1990 were overseas. That figure is expected to increase to 11% in 1991.

*Figures for 1991 are estimated.

GRAPHIC BY SUSAN J. CHAMPENY SOURCE: HAMBRECHT & QUIST, INC., SAN FRANCISCO

Voice response wins its place in the sun

Technology picking up speed in several vertical industries as more users recognize its potential.

By Bob Wallace
Senior Editor

ANAHEIM, Calif. — High-profile success stories are fueling rapid user acceptance of voice response technology and significant growth in that marketplace, said users and analysts at the recent Voice '91 conference here.

Users said voice response technology not only helps companies provide faster, more economical customer service, it pays for itself quickly. As a result, use of the technology is spreading beyond its financial/banking stronghold to a growing number of vertical industries.

Voice response systems enable customers to retrieve data from computers using push-button telephones. That enhances customer service by streamlining call processing.

Voice response units are already widely used in the banking industry to give callers access to information such as account balances and which checks have been processed. Also, financial services firms use the units to offer telephone-based trading capabilities to their customers.

Speedy payback

"I've seen voice response applications with an eight-week payback. They tend to have short paybacks, which is a compelling reason to [implement] them," said Stephen Levy, a senior technology analyst with Hambrecht & Quist, Inc., a market research and consulting firm in San Francisco.

Hambrecht & Quist predicts rapid proliferation of voice response units in other vertical industries. The voice response market has already grown from total annual revenues of $125.5 million in 1987 to $339.8 million in 1990. The firm expects the market to swell to $405.8 million by year end (see chart, this page).

The voice response market is not dominated by any single vendor. AT&T and Syntellect, Inc. shared the lead in this crowded industry with each holding a 12% market share in 1990.

A typical voice response system consists of a stand-alone voice processor running custom software and linked to the company's computer and phone systems.

> "I've seen voice response applications with an eight-week payback," Levy said.

▲▲▲

Customers calling into voice response units are greeted with a prerecorded message listing several options that can be selected from a push-button phone. The system can also prompt callers to enter account numbers and personal identification numbers before completing transactions.

Voice response units convert data in a host data base to digitized speech, which the caller hears.

Ease of use and the ability to automate worker-intensive appli-

(continued on page 26)

Which V.32 Modem Is The Most Intelligent Buy? Ours Tops The Chart.

..."Digicom's 9624LE+ offers above average performance, good compatibility...plenty of optional features and even fax support.". PC WEEK

PC WEEK High-speed Modem Product Review / November 19, 1990

PC WEEK LABS — ANALYST'S SCOREBOARD

	Digicom Systems Inc. 9624LE+	Hayes Microcomputer Products, Inc. Hayes Ultra 96	Microcom Inc. QX/4232hs	Multi-Tech Systems Inc. MultiModem V32	Universal Data Systems, Inc. FasTalk V.32/42b	U.S. Robotics Inc. Courier V.32
1. Price / Performance	●	◒	◒	◒	◒	◒
2. Support of Older Modems	●	●	●	●	●	●
3. V.32 / V.42bis Compatibility	●	●	◒	○	○	●
4. Overall Performance	●	●	●	●	●	●
5. Quality of Workmanship	●	◒	◒	◒	◒	◒

● GOOD ◒ SATISFACTORY ○ NEEDS IMPROVEMENT

NOW 14,400 V.42bis +FAX

Fax available in PC, Mac and Unix versions

Quality and Value

It's true. Digicom Systems has improved on its already outstanding V.32 technology. Now we've designed our V.32 standard modems to run at 14.4K bps and V.42bis. The PLUS™ option available now through DSI enables you to realize a 50% improvement in actual modem performance. And that's at full-duplex.

Time is Money

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The Future is Now

Digicom's DSP chip makes add-in support for other communication standards easier than ever. Our PLUS™ option V.32 modem now supports V.42 and V.42bis with V.32bis. And fax capabilities are also included!

Digicom Systems' new V.32 modem with the PLUS™ option. Faster, more efficient *and* cost effective. Ahead of the competition, and staying there.

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DATA COMMUNICATIONS

PRODUCTS, SERVICES, ARCHITECTURES, STANDARDS AND NETWORK MANAGEMENT

Worth Noting

> “Right now standardized network control is probably the single most important thing that’s necessary for the continued growth of the industry.”
>
> **Duncan Campbell**
> Marketing manager
> Colorado Networks Division
> Hewlett-Packard Co.
> Fort Collins, Colo.

Data Packets

AT&T EasyLink Services last week announced links between its AT&T Mail electronic mail service and four other public E-mail nets, including the first X.400-based public E-mail net connection to CompuServe, Inc.’s CompuServe Mail network.

Later this year, AT&T EasyLink Services plans another X.400 connection between CompuServe Mail and EasyLink Mail, the AT&T unit’s other E-mail service.

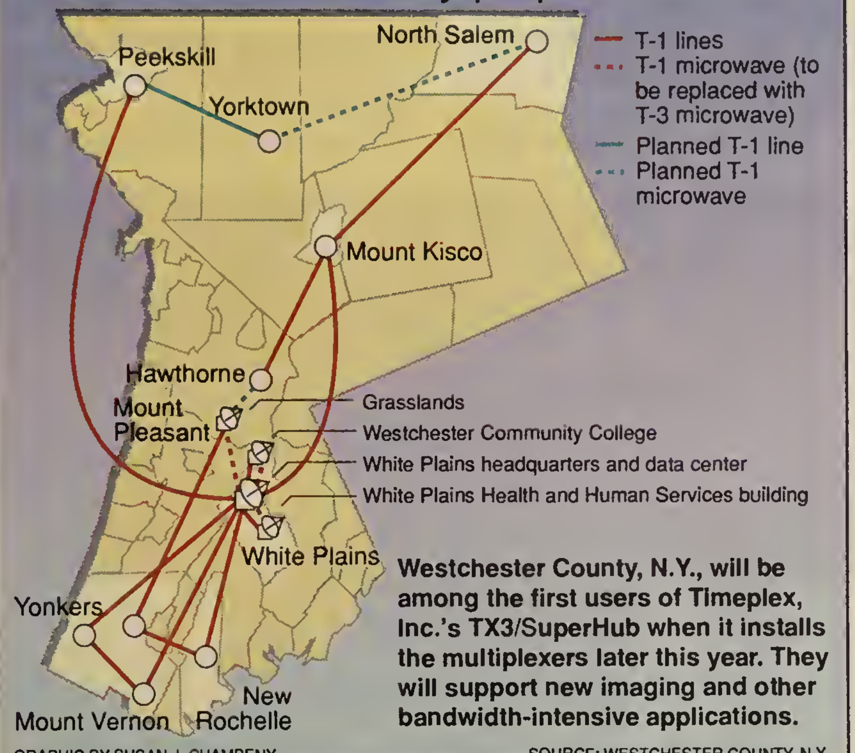
Also available now via AT&T Mail are international links to iNet Hong Kong, Ltd.’s Hutchinson INET, Norwegian Telecom’s TelemaX.400 and Telecom Denmark’s Datapost 400 E-mail networks.

General DataComm Industries, Inc. last week announced the successful completion of a compatibility test between its Megamux TMS T-1 multiplexers and switched AT&T services.

The test ensured that the Megamux TMS is compatible with AT&T’s switched 384K bit/sec service, as well as with the Integrated Services Digital Network HO channels over which it is delivered, and with AT&T’s Software-Defined Data Network.

The Megamux TMS previously passed compatibility tests with AT&T’s ISDN Primary Rate Interface and Accunet Spectrum of Digital Services, which are the carrier’s fractional T-1 offerings.

Westchester County prepares for T-3


North Salem
Peekskill
Yorktown
Mount Kisco
Hawthorne
Mount Pleasant
Grasslands
Westchester Community College
White Plains headquarters and data center
White Plains Health and Human Services building
White Plains
Yonkers
Mount Vernon
New Rochelle
T-1 lines
T-1 microwave (to be replaced with T-3 microwave)
Planned T-1 line
Planned T-1 microwave

Westchester County, N.Y., will be among the first users of Timeplex, Inc.’s TX3/SuperHub when it installs the multiplexers later this year. They will support new imaging and other bandwidth-intensive applications.

GRAPHIC BY SUSAN J. CHAMPENY

SOURCE: WESTCHESTER COUNTY, N.Y.

County to install T-3 links to support LAN applications

Westchester to install T-3 links, Timeplex muxes.

By Paul Desmond
Senior Editor

WHITE PLAINS, N.Y. — The county of Westchester, N.Y., recently unveiled plans to upgrade its T-1 network with four T-3 nodes that will link local-area networks supporting imaging and other bandwidth-intensive applications.

The county plans to install private T-3 microwave links along with four Timeplex, Inc. TX3/SuperHub T-3 multiplexers, making it one of the early users of that product, which was announced in early 1990.

Timeplex said it has sold 24 of the switches to 10 other customers but would not identify any of those users.

Westchester County currently has 13 Timeplex Link/2 multiplexers installed at 11 locations, according to Robert Gallagher, director of distributed systems for the county. The Link/2s are connected via private microwave or leased terrestrial T-1 lines.

The network supports data traffic between about 2,000 terminals and personal computers countywide and the county’s IBM 3090 and Unisys Corp. 1100 mainframes here.

Bandwjdth demand on rise

Today, the county has only a few installed LANs that are bridged to the T-1 backbone at 56K bit/sec. However, plans call for additional LANs in at least 10 major county offices and forthcoming imaging applications will require a full T-1 to be dedicated to the LAN bridges, Gallagher said.

The need for that extra bandwidth, coupled with long-term growth projections, prompted the move to T-3.

“Eventually, we’re going to reach the point where the cost of the T-1s would be more expensive than a single T-3,” he said. “Plus, our initial implementation will be on private microwave so there’s no recurring [line] costs.”

The imaging applications include one for the county clerk’s office. Legal documents such as land records, titles and deeds will be stored on an optical disk and may be retrieved by users on personal computers anywhere in the network.

Engineers using computer-aided design applications in the county’s public works department will also benefit from the increased bandwidth, which will enable employees to pull up blueprints and other documents from locations other than the headquarters office here, Gallagher said.

The T-3 nodes will be collocated with existing Link/2 multiplexers in four locations in or near White Plains (see graphic, this page). The Link/2s will continue to support the attachment of local devices but will feed full T-1 circuits to the TX3/SuperHub, which can support 10 T-3s.

The county has gone out to bid for microwave equipment to upgrade the T-1 microwave links that currently connect three remote sites to the data center here.

The four Timeplex T-3 multiplexers, which cost a total of $193,000, are expected to be installed by year end.

NIST to release fed net mgmt. standard

Specs will differ from profile by OSI/NM Forum, increasing possibility of interoperability problems.

By Paul Desmond
and Ellen Messmer
Network World Staff

WASHINGTON, D.C. — The National Institute of Standards and Technology (NIST) this month will issue a proposed profile that will specify features for all net management products bought by federal agencies, government officials said recently.

The set of proposed specifications, called the Government Network Management Profile (GNMP), will differ from a document issued by the Open Systems Interconnection/Network Management (OSI/NM) Forum, thus raising the specter that products developed for the different profiles will not interoperate.

The emergence of a second network management profile could muddy vendors’ plans for network management products to support the OSI/NM Forum’s profile. Ultimately, the existence of the two profiles could slow development of products for commercial and government end users, although officials from both groups said they will work to make their profiles compatible.

GNMP is based on implementation agreements from the OSI Implementor’s Workshop Special Interest Group for Network Management (SIGNM), according to Kevin Mills, chief of the systems and network architecture division at NIST who recently began circulating the final GNMP draft for informal comment.

For the past two years, NIST has considered launching a network management profile to complement its Government Open Systems Interconnection Profile (GOSIP), which currently specifies standards for the government’s communications procurements, Mills said.

“Our goal is to give users some focus, which could give direction to the industry,” Mills said.

One factor that differentiates GNMP from the OSI/NM Forum’s effort is that GNMP is based on recent versions of the OSI standards, according to Paul Brusil, chairman of the SIGNM and prin-

(continued on page 16)

Switch helps users build private frame relay nets

By Jim Brown
Senior Editor

COSTA MESA, Calif. — Frame Relay Technology, Inc. last week introduced its first frame relay switch, the FrameMux 1200.

The product is being positioned as a tool that will enable users to build a private frame relay-based backbone network.

Each FrameMux 1200 supports as many as three Ethernet ports and 16 RS-232, V.35 or RS-422 interfaces that can be configured as an interface to wide-area network circuits or to receive data from local data terminal equipment, such as local-area network routers and front-end processors.

FrameMux products obviate the need to retrofit existing LAN routers or front-end processors with frame relay interface boards. Instead, users can simply connect existing equipment to a FrameMux switch, a FrameMux working with a T-1 multiplexer-based frame relay switch or public frame relay service.

The FrameMux 1200 can accept traffic from as many as three Ethernets at 10M bit/sec each and up to 15 other data terminal devices supporting different protocols, such as IBM’s Systems Network Architecture or X.25, at up to T-1 speeds. The product then wraps that traffic in frame relay packets and switches it over a leased T-1 circuit or high-speed public network service to a remote site.

Alternatively, users needing multiple wide-area links can reduce the number of ports supporting local data terminal equipment in favor of wide-area links.

The company is working on a token-ring network interface for the FrameMux 1200.

An entry-level FrameMux 1200 supporting a single Ethernet and eight RS-232, V.35 or RS-422 ports costs $16,500 and is available now. Users can purchase boards supporting two additional Ethernet interfaces and eight RS-232, V.35 or RS-422 ports for $8,000.

NIST to release mgmt. standard

continued from page 15

cipal scientist at Mitre Corp. in Bedford, Mass.

"Right now, the GNMP is a little more forward-looking in that it's pointing to more recent, more mature standards than the current version of the Network Management Forum's work," he said.

NIST officials made it clear that regardless of what develops in the OSI/NM Forum, the government must define network management products for the sake of government users.

"The point is, we need something now. And this is the best we can find," said Fran Nielsen, manager of the SIGNM at NIST and head of the GNMP project.

Initially, GNMP will address management of physical layers, including OSI local-area networks, X.25 packet-switched nets, Integrated Services Digital Networks, Fiber Distributed Data Interface nets, modems, multiplexers and bridges.

Phase II of the specification, to be released a year after Phase I, is expected to include information necessary for managing implementations of the functions specified for Layers 3 through 7 of the OSI reference model, which includes more sophisticated equipment such as routers, terminal servers and private branch exchanges.

Phase III, due out a year after Phase II, will specify ways to control applications and data base management systems.

Although the NIST and OSI/NM Forum profiles both reference the established ISO Common Management Information Protocol/Common Management Information Services (CMIP/CMIS), the two documents differ in an area where little standards work has been completed to date — object-oriented descriptions.

Both profiles have their own library of management object definitions, each describing the attributes of various devices in a network and how to manage them. The NIST document has more than 70 descriptions, while the OSI/NM Forum document defines 35 entities.

One group's definition of a modem, for example, may differ from the other's. Net management products designed to one group's specifications may not work with products designed to the other.

"We have not included [the forum's] objects because of copyright issues and process issues," Mills said.

Robert Montgomery, president of the OSI/NM Forum, said the copyright "was not intended to be an impediment to anybody. If people view it as an impediment, it will be removed."

Montgomery said the OSI/NM Forum has informally communicated to Mills that the copyright will be waived and that he will soon formalize the statement.

Brusil pointed to other differences in the two management profiles. The OSI/NM Forum froze its specification about a year ago and based products on early specifications known as committee draft-level standards, he said. The OSI/NM Forum has said its profile will be updated when the standards are complete.

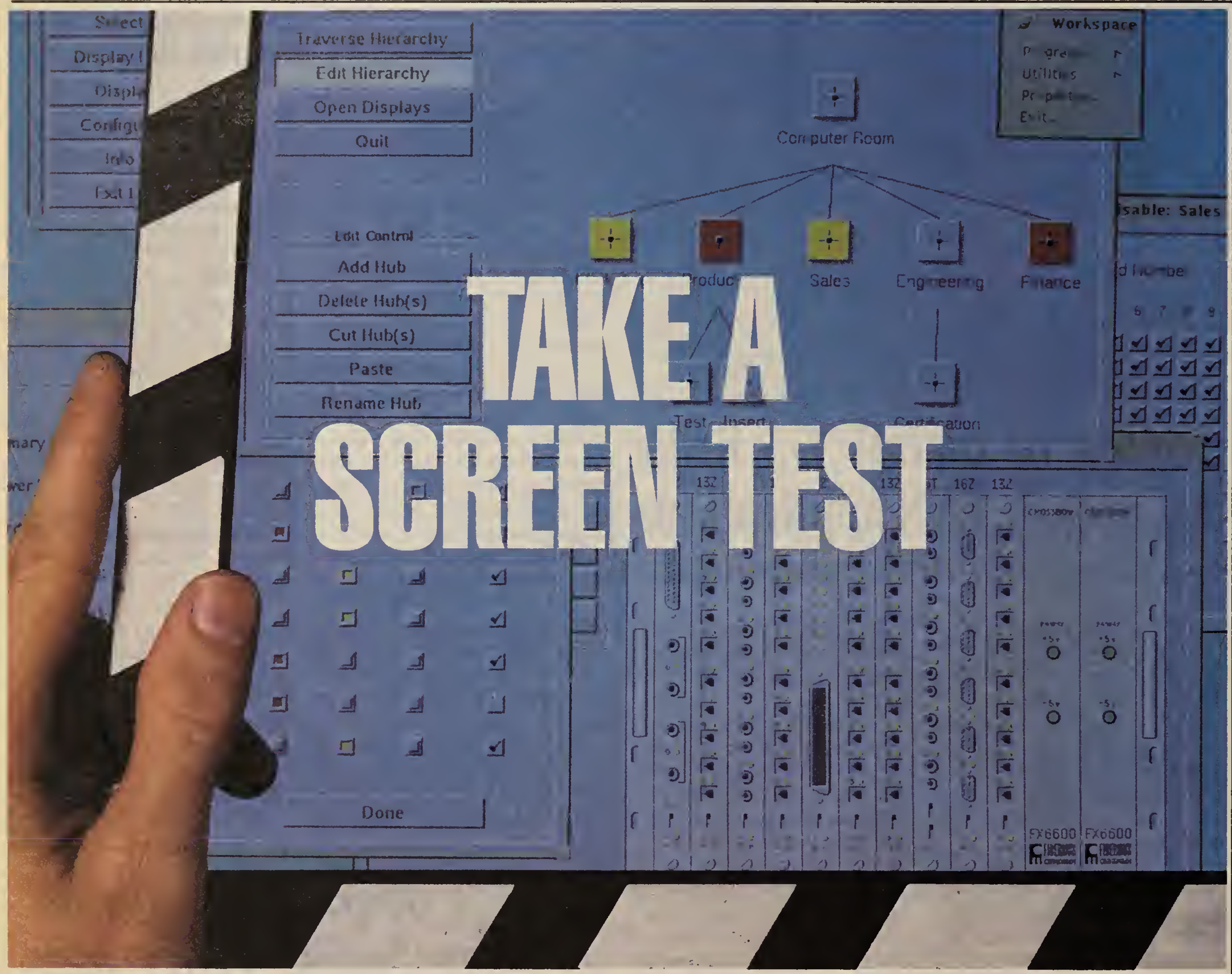
The SIGNM never freezes its implementations. Rather, it continually updates them as the latest specifications emerge from the International Standards Organization, Brusil said.

The SIGNM's current net management product implementation agreements are based on draft international standards, Brusil said. They will be updated to comply with the full international standards this summer.

After NIST releases the GNMP proposal, it faces a 90-day comment period, after which it can move to have the GNMP passed as a Federal Information Processing Standard (FIPS) and a mandatory government procurement specification for network and systems management products.

Nielsen said she anticipates it will take one year to see GNMP passed as a FIPS. An additional 12 to 18 months will then follow before the GNMP mandate becomes a purchasing requirement.

By that time, the OSI/NM Forum may update its own implementation profile, Brusil said.



Actual unretouched photo.

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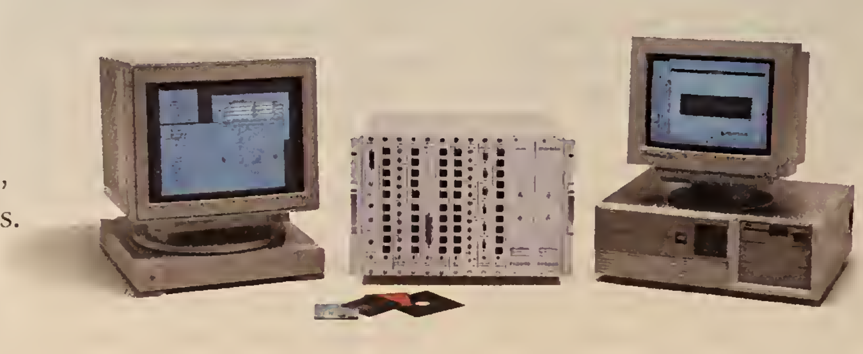

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C. Please Answer ALL Questions, Sign & Date the Form.

1 Industry: (check one only)

01. ☐ Manufacturers (other than computer/communications)
02. ☐ Finance/Banking
03. ☐ Insurance
04. ☐ Real Estate
05. ☐ Healthcare Services
06. ☐ Legal
07. ☐ Hospitality
08. ☐ Retail/Wholesale Trade
09. ☐ Transportation
10. ☐ Utilities
11. ☐ Education
12. ☐ Process Industries (Mining/Construction/Petroleum Refining/Agriculture/Forestry)
13. ☐ Government State/Local
14. ☐ Government Federal
15. ☐ Military
16. ☐ Aerospace
17. ☐ Consultants (independent)
18. ☐ Carriers
19. ☐ Interconnects
20. ☐ Manufacturers (Computer/Communications)
21. ☐ VAR/VAD/Systems House
22. ☐ Distributor, Computer Related
23. ☐ Distributor, Communications Related
24. ☐ Other ____________

2 Job function: (check one only)

1. ☐ Networking Management (Responsible for both voice & data)
2. ☐ MIS Management (VP, Dir., Department Head)
3. ☐ Corporate Management (Chairman, President, Owner, General Manager, CEO, CIO, VP)
4. ☐ Data Communications Management (Responsible for data only)
5. ☐ Telecommunications Management (Responsible for voice only)
6. ☐ Financial Management
7. ☐ Engineering Management
8. ☐ Consultant (Independent)
9. ☐ Other ____________

3 What is the scope of your involvement in purchase decisions for Network/Communications products + services? (check one only)

1. ☐ Enterprise Wide (Organization/Subsidiary/Division)
2. ☐ Multi Enterprise (Consultants)
3. ☐ Department Wide

4 What is the total number of sites for which you have purchase influence?

1. ☐ 100+
2. ☐ 50 - 99
3. ☐ 20 - 49
4. ☐ 10 - 19
5. ☐ 2 - 9
6. ☐ 1

5 Your primary responsibility: (check one only)

1. ☐ Both Data + Voice
2. ☐ Data Networking Only
3. ☐ Voice Networking Only
4. ☐ None

6 Which transmission media do you use in your network: (check all that apply)

Public:
01. ☐ Switched-Based (DDD, Wats, Megacom, etc.)
02. ☐ Leased Line (not including T-1)
03. ☐ T-1
04. ☐ Fractional T-1
05. ☐ T-3/SONET
06. ☐ Broadband
07. ☐ ISDN

Private:
08. ☐ Satellite
09. ☐ Microwave
10. ☐ Fiber Optic

7 Is your network: (check all that apply)

LOCAL AREA NETWORK
1. ☐ Local (within building)
2. ☐ Local (in a campus environment)

WIDE AREA NETWORKS
3. ☐ International
4. ☐ National
5. ☐ Regional (several states)
6. ☐ Metropolitan

8 What is your network architecture? (check all that apply)

1. ☐ SNA
2. ☐ DECNET
3. ☐ OSI
4. ☐ GOSIP
5. ☐ MAP/TOP
6. ☐ TCP/IP
7. ☐ DCA (UNISYS)
8. ☐ OTHER ____________

9 What is your LAN Operating System? (check all that apply)

01. ☐ 3COM (3+, 3+open)
02. ☐ LOCAL TALK (APPLETALK)
03. ☐ BANYAN (VINES)
04. ☐ DCA (IRMALAN)
05. ☐ IBM (LAN Server)
06. ☐ IBM (PC LAN PROGRAM)
07. ☐ MICROSOFT (LAN MANAGER)
08. ☐ UNGERMAN BASS (NET/1)
09. ☐ NOVELL (NETWARE)
10. ☐ TOPS
11. ☐ PROTEON (PRONET)
12. ☐ OTHER ____________

10 What is your LAN environment? (check all that apply)

1. ☐ 4M TOKEN RING
2. ☐ 16M TOKEN RING
3. ☐ ARCNET
4. ☐ ETHERNET
5. ☐ STARLAN
6. ☐ FDDI
7. ☐ LOCALTALK
8. ☐ 10BASET
9. ☐ OTHER ________

11 Which operating systems do you utilize? (check all that apply)

1. ☐ IBM DOS (VSE)
2. ☐ UNIX
3. ☐ OS/2
4. ☐ OS/2 Extended Edition
5. ☐ MVS
6. ☐ VM
7. ☐ VMS
8. ☐ XENIX
9. ☐ PICK
0. ☐ OTHER ______

12 Please indicate by vendor the number of mainframes/minicomputers installed in your network.

VENDOR	MAINFRAMES A	MINIS B
01. DEC		
02. IBM		
03. AMDAHL		
04. AT&T		
05. BULL HN IS		
06. NCR		
07. DATA GENERAL		
08. WANG		
09. HEWLETT PACKARD		
10. PRIME		
11. TANDEM		
12. UNISYS		
13. CONTROL DATA		
14. OTHER		

13 Please indicate by vendor the number of microcomputers/workstations:

A. Presently installed in your network.

B. The approximate quantity you plan to install in the next 12 months.

MICROCOMPUTER/ WORKSTATION/ VENDOR	PRESENTLY INSTALLED A	PLAN TO INSTALL NEXT 12 MONTHS B
01. PCs based on 80286 chip		
02. PCs based on 80386 chip		
03. PCs based on 80486 chip		
04. 8086/8088		
05. Macintosh		
06. RISC-based workstations		
07. UNIX-based workstations		

14 What is your planned PC standard? (check all that apply)

1. ☐ EISA
2. ☐ MCA
3. ☐ NUBUS (MACINTOSH)

15 For which areas outside of the U.S. do you have purchasing influence? (check all that apply)

1. ☐ Europe
2. ☐ Asia
3. ☐ South America
4. ☐ Australia
5. ☐ Middle East

16 Check ALL that apply in columns A and B

A) I am presently involved in the purchase process for the following products/services:

B) I plan to purchase the following products/services in the next 12 months:

Presently Involved A	Plan to Purchase B	
		LOCAL AREA NETWORKS:
01. ☐	☐	Local Area Networks
02. ☐	☐	LAN Servers
03. ☐	☐	LAN Services
04. ☐	☐	Cables, Connectors, Baluns
05. ☐	☐	Bridges, Routers, Gateways
06. ☐	☐	UPS
07. ☐	☐	LAN Storage Devices
A	B	COMPUTERS/PERIPHERALS:
08. ☐	☐	Micros
09. ☐	☐	Minis
10. ☐	☐	Mainframes
11. ☐	☐	Front End Processors
12. ☐	☐	Terminals
13. ☐	☐	Laptops
14. ☐	☐	Printers
15. ☐	☐	Work Stations
16. ☐	☐	Cluster Controllers

(continued on next column)

Presently Involved A	Plan to Purchase B	SOFTWARE:
17. ☐	☐	Network Management
18. ☐	☐	Micro to Mainframe
19. ☐	☐	Network Security
20. ☐	☐	Call Accounting
21. ☐	☐	Distributed DBMS
22. ☐	☐	Communications Software
23. ☐	☐	Applications Software
24. ☐	☐	Network Operating Systems Software
25. ☐	☐	EDI Software
26. ☐	☐	E-Mail Software
A	B	DATA COMMUNICATIONS:
27. ☐	☐	Modems (over 9.6kbps)
28. ☐	☐	Modems (under 9.6kbps)
29. ☐	☐	T-1 Multiplexers
30. ☐	☐	T-3 Multiplexers
31. ☐	☐	Fractional T-1 Multiplexers
32. ☐	☐	Data Switches
33. ☐	☐	Matrix Switches
34. ☐	☐	Packet Switches
35. ☐	☐	Protocol Converters
36. ☐	☐	Network Management Systems
37. ☐	☐	Terminal Emulation Boards
38. ☐	☐	Facsimile Machines
39. ☐	☐	Diagnostic Test Equipment
40. ☐	☐	DSU/CSU
41. ☐	☐	Data Security
42. ☐	☐	Data Compression Equipment
43. ☐	☐	Network Adapter Boards
44. ☐	☐	Microwave
45. ☐	☐	Messaging Software
A	B	TELECOMMUNICATIONS:
46. ☐	☐	PBXs (over 1000 lines)
47. ☐	☐	PBXs (200 - 1000 lines)
48. ☐	☐	PBXs (under 200 lines)
49. ☐	☐	Key Systems
50. ☐	☐	Automatic Call Distributors
51. ☐	☐	Voice Messaging Systems
52. ☐	☐	Video Teleconferencing Systems
A	B	SERVICES:
53. ☐	☐	Switched Voice
54. ☐	☐	Dedicated Leased Line
55. ☐	☐	T-1
56. ☐	☐	T-3
57. ☐	☐	Digital Data
58. ☐	☐	Packet Switched
59. ☐	☐	Centrex
60. ☐	☐	Central Office Lan
61. ☐	☐	Satellite
62. ☐	☐	On-Line Information
63. ☐	☐	ISDN
64. ☐	☐	EMail
65. ☐	☐	VSAT

17 Estimated value of networking equipment and services:

A: Which you helped specify, recommend or approve in the last 12 months?

B: Which you plan to help specify, recommend or approve in the next 12 months?

A	B
1 ☐	☐ $100 million and over
2 ☐	☐ $50 - $99.9 mill
3 ☐	☐ $25 - $49.9 mill
4 ☐	☐ $20 - $24.9 mill.
5 ☐	☐ $10 - $19.9 mill.
6 ☐	☐ $5 - $9.9 mill.
7 ☐	☐ $1 - $4.9 mill.
8 ☐	☐ $500,000 - $999,999
9 ☐	☐ Under $500,000

18 Estimated gross annual revenue of your entire company/institution: (check one only)

1. ☐ over $10 billion
2. ☐ $1 to $9.9 bill.
3. ☐ $500 to $1 bill.
4. ☐ $100 to $499.9 mill.
5. ☐ $50 to $99.9 mill.
6. ☐ $10 to $49.9 mill.
7. ☐ $5 to 9.9 mill.
8. ☐ under $5 mill.

19 Estimated number of employees for your entire corporation:

1. ☐ over 10,000
2. ☐ 5,000 - 9,999
3. ☐ 2,500 - 4,999
4. ☐ 1,000 - 2,499
5. ☐ 500 - 999
6. ☐ under 500

20 Which of the following ISDN products do you plan to purchase in the next 12 months? (check all that apply)

1. ☐ Basic Rate Interface Terminal Adapters
2. ☐ Primary Rate Interface Equipment
3. ☐ Voice/Data terminals
4. ☐ Voice-only terminals
5. ☐ Data-only terminals

21 From which of the following vendors will you consider buying your PBX/Central Office Switch? (check all that apply)

A PBX	B COS	
A ☐	☐	AT&T
B ☐	☐	ALCATEL
C ☐	☐	ERICSSON
D ☐	☐	FUJITSU
E ☐		HARRIS
F ☐		HITACHI
G ☐		ROLM
H ☐		INTECOM
I ☐		MEMOREX TELEX
J ☐		MITEL
K ☐	☐	NEC
L ☐	☐	NORTHERN TELECOM
M ☐		SAMSUNG
N ☐	☐	SIEMENS
O ☐		STROMBERG-CARLSON
P ☐		TOSHIBA
Q ☐	☐	OTHER ____________

NETWORK WORLD
The Newsweekly of Enterprise Networking Strategies
An IDG Publication

91NN

LOCAL NETWORKING

PC AND TERMINAL-TO-HOST LANS, GATEWAYS AND MICRO COMMUNICATIONS PRODUCTS

Worth Noting

> "If you're putting in an imaging system or any new technology, for that matter, pay attention to the organizational impact rather than the technology. The technology will take care of itself; the organization will never take care of itself."
>
> **Ira Morrow**
> Vice-president for
> technical planning
> The Securities Information Group
> of American Express Co.
> New York

Netnotes

Lotus Development Corp. has announced a version of Lotus Notes office automation software for Banyan Systems, Inc.'s VINES network operating system.

Notes allows users to create and share files and messages. By running the software under VINES, users will be able to access wide-area networking capabilities. Lotus Notes for VINES is currently in beta test.

Lotus and Computer Mail Services, Inc. are developing a mail gateway between Notes mail and VINES mail. Lotus is also working to integrate VINES' StreetTalk distributed naming system with Notes' Name & Address Book.

Lotus Notes for VINES is expected to be available shortly after the release of VINES Version 4.10, which is scheduled for June.

Beame & Whiteside Software, Ltd. of Toronto has released software that allows personal computers running Novell, Inc.'s LAN Workplace for DOS to be Network File System (NFS) clients. The software will allow personal computers to share files with Unix and other systems that support the industry-standard NFS.

Novell's LAN Workplace for

(continued on page 20)

Reach's MailMAN for VINES based on open architecture

Designed to access other E-mail programs, too.

By Timothy O'Brien
West Coast Bureau Chief

SUNNYVALE, Calif. — Reach Software, Inc. this week announced MailMAN, a Microsoft Corp. Windows-based electronic mail product for Banyan Systems, Inc.'s VINES that is designed to allow access to other E-mail programs.

Although MailMAN's initial release only supports VINES, it is based on an open architecture and will eventually provide a front end to the data base component of popular E-mail programs. In this capacity, MailMAN will use Novell, Inc.'s Message Handling System (MHS), Lotus Development Corp.'s cc:Mail and Microsoft's LAN Manager, as well as VINES as a back-end "mail server."

Because messages can be composed, viewed, managed and integrated with applications across those systems, MailMAN will extend the capabilities of E-mail in a mixed vendor local-area network environment. MailMAN will support features such as store-and-forward messaging, folder management and naming in the various mail programs.

The MailMAN user interface, based on Windows, will be the foundation of several more LAN-based products due out later this year. These new "work flow" products, as they are called by Reach, are designed to organize, route and integrate electronic mail data with applications across a group or enterprise.

For instance, with a feature called "the application launch facility," users can open other Windows applications from within MailMAN.

These new products will target applications that require step-by-step input or approval from various sources within an organization. Some of these areas could include the routing of forms such as check and travel requests, distribution of sales leads, purchase order processing and claims processing.

"We approach the idea of work flow applications from the bottom up, the same way that PCs and networks grew," said Anand Jagannathan, president and founder of Reach. "We use the LANs and E-mail already in place."

Jagannathan said he believes that top-down approaches to work flow take too long and get bogged down by the need to alter corporate networked environments.

Running under Windows 3.0, MailMAN requires a minimum of 1M to 2M bytes of random-access memory on the personal computer. MailMAN for VINES is priced at $995 for a 20-user license and $1,995 for an unlimited user license (per mail server). MailMAN is currently being beta-tested at a number of sites and is scheduled to ship in June in conjunction with VINES Release 4.10, which adds support for Windows.

For more information, contact Reach at 330 Potrero Ave., Sunnyvale, Calif. 94086, or call (408) 733-8685. ■

HP unveils enhancements to NewWave Office pack

By Jim Brown
Senior Editor

PALO ALTO, Calif. — Hewlett-Packard Co. recently unveiled an upgrade that adds new or enhanced office automation services to its NewWave Office package and announced a program to help third-party vendors integrate their applications into NewWave Office's object-oriented environment.

HP said it will also offer a systems integration consulting service designed to assist users in implementing NewWave Office, which enables DOS-based clients to transparently access server-based applications and data.

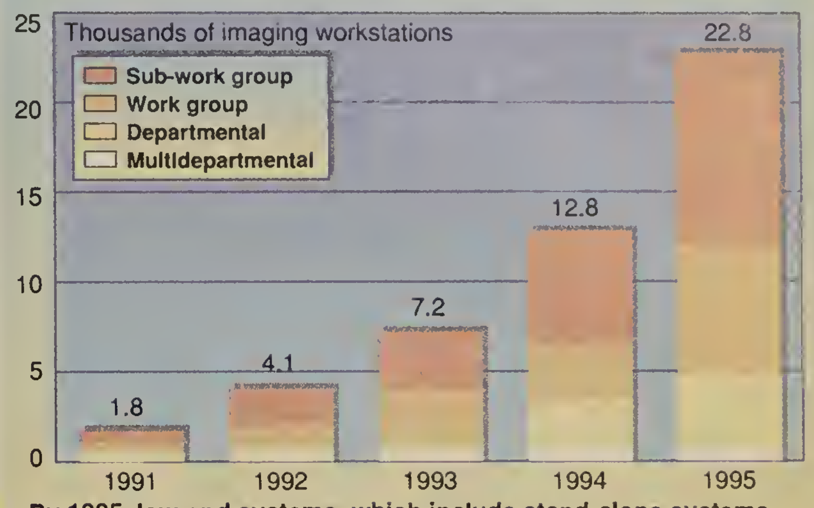
Chief among the enhancements is NewWave Environment 3.0, an enhanced graphical user interface and object management facility for DOS-based clients running Microsoft Corp.'s Windows 3.0.

The product makes it possible to display server-based applications or services as icons on the client's screen. Users click on an icon to start up a server-based application or use a network service such as printing.

NewWave Environment also enables users to create their own icon objects that contain a series of commands. This will make it

(continued on page 20)

Imaging on small systems will dominate



By 1995, low-end systems, which include stand-alone systems and LANs with 4- to 15- workstations, are expected to account for more than 77% of all imaging applications.

GRAPHIC BY SUSAN J. CHAMPENEY SOURCE: BIS STRATEGIC DECISIONS, NORWELL, MASS.

Ups and downs of LAN imaging systems

American Express pilot-testing imaging system but finding people side of changeover difficult.

By Caryn Gillooly
Senior Editor

Document imaging systems based on local-area networks are fast becoming part of mainstream computing, causing new problems for already burdened LAN administrators.

While the drawbacks of imaging systems may seem trivial compared to the capabilities they afford, it is important to remember that many such systems are proprietary, users may not accept them quickly and the LAN traffic they create can be crippling.

Regardless of these difficulties, analysts agree that LANs will be the medium used to bring imaging to the common user. "The great thing is that LANs are going to populate the concept of what imaging can do," said Scott McCready, director of image systems at International Data Corp. (IDC)/Avante.

Dataquest, Inc., a research firm in San Jose, Calif., said the imaging market was worth just under $1.9 billion in 1990 and will be worth an estimated $7 billion by 1995.

A natural fit

Dave Hudson, a senior consultant at BIS Strategic Decisions in Norwell, Mass., said that because imaging has a server-based architecture, the technology is more commonly found in LANs, as opposed to mainframe- or minicomputer-based environments.

He explained that today's typical image system comprises an image server, a scanning server, a print server and an optical disk system. Depending on the application, other components such as communications servers may be included. All of these components can reside in one box.

The Securities Information Group of American Express Co. in New York is undergoing a pilot test to implement imaging on a Novell, Inc. NetWare LAN, said Ira Morrow, vice-president for technical planning at the group.

Currently, paper documentation for existing and new customers originates in branch offices throughout the country. It is mailed to the New York office, where it is processed and mailed back to the branches for updates.

> Dataquest said the imaging market will be worth an estimated $7 billion by 1995.
>
> ▲▲▲

With the imaging system, documents will be scanned and routed electronically to the home office, where they will be stored in an image server. From there, headquarters personnel and remote users will be able to access and update customer information without having to exchange paper documents. The images, Morrow said, will be routed over a domestic private network.

"We're taking [an account entry and update] process that regularly takes 10 to 20 days and skrinking it to a higher quality

(continued on page 20)

1975 *Launched the first U.S. public data network.* 1980 *Integrated private and public capabilities to provide the first hybrid network. Launched the first major public e-mail service.* 1984 *Sprint*

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wide. 1989 *World's first and largest privately-owned transatlantic fiber optic cable completed.* 1990 *Sprint announces the first commercial video services to the Soviet Union.*

Navy enlists Intergraph to build new CAD/CAM nets

By Ellen Messmer
Washington Correspondent

WASHINGTON, D.C — The U.S. Navy recently awarded a portion of its hotly contested CAD-2 contract to Intergraph Corp., signing the vendor to supply a new generation of networked workstations and servers for computer-aided design and manufacturing.

Under the contract, Intergraph and several subcontractors, including 3Com Corp., will provide CAD/CAM systems and local-area network integration services for use at naval shipyards, aboard vessels and in naval offices.

The contract, with a potential value of $362.4 million over a 12-year period, is the first of four to be awarded under the Navy's $2 billion CAD-2 program for modernizing its CAD/CAM systems.

Navy officials declined to provide details about the award until a 10-day moratorium expires, giving the Navy a chance to inform all bidders of the final decision. Advanced Technology, Inc., Computervision Corp. and Sun Microsystems, Inc. also bid on the project.

Under the Naval Sea Systems Command's (NAVSEA) CAD-2 award, U.S. naval shipyards installing new engineering applications can purchase products and services according to their own hardware, software and support requirements.

The contract allows the Navy to purchase as many as 2,820 Intergraph 6000 Series Unix-based workstations, 450 InterServe file servers, an indefinite quantity of Intergraph and third-party graphics packages, and 4,000 Intergraph display/graphics processors.

The equipment will be used at various naval sites across the country; all sites that order CAD/CAM equipment will standardize on Ethernet LANs supporting the Transmission Control Protocol/Internet Protocol.

At campus sites with several CAD/CAM nets, 3Com will provide internetworking equipment, including its CS/2000 asynchronous terminal server, NCSAT network control server and IB/3 internetworking bridges.

Dick Stark, 3Com's federal region manager, said the IB bridges will be the primary means of interconnecting design nets in the campus environment. He added that 3Com will also provide wiring hubs and terminal servers for linking local devices to the LANs.

The 500,000 man-hours of installation, maintenance and support called for under CAD-2 will largely be provided by Martin Marietta Information Systems Group, shipyard repair company Jonathan Corp. and engineering firm CASDE Corp.

All equipment and software supplied for the contract will support a number of standards, including the Initial Graphics Exchange Specification, the Portable Operating System Interface and the Product Data Exchange Specification, as well as all Government Open Systems Interconnection Profile requirements.

The products and services will also conform to the 1840-A standard for graphics established as part of the military's Computer-Aided Acquisition and Logistics Support program for converting paper-based information to digital formats during the 1990s.

Andy Wilkinson, vice-president of the Intergraph Federal Systems division, said the Air Force and Army are also interested in purchasing equipment and services off the NAVSEA CAD-2 contract, but there was no final word on those orders yet.

The next CAD-2 procurement will be the award of an estimated $600 million Naval Facilities Command contract, expected by year end. A CAD-2 request for proposal from the Naval Air Command is also expected later this spring.

> The Air Force and Army are interested in purchasing equipment and services off the NAVSEA CAD-2 contract, but there was no final word on those orders yet.

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Ups and downs of LAN imaging

continued from page 17

process that will only take one to two days," Morrow said.

To implement the project, the group is beta-testing Wang Laboratories, Inc.'s Open/Image for NetWare, a software package that runs as a NetWare Loadable Module on a NetWare server and allows for the development of user-specific applications.

Open/Image for NetWare runs on the NetWare server, Morrow said. The group's goal was to use the existing personal computers, software and operating system and to disrupt operations as little as possible.

The pilot system is currently being used at the group's headquarters. The next step will be to implement an image server that will handle traffic from branches throughout the country.

Today's problems

There is bad, however, with the good. According to Morrow, one of the biggest problems with the installation at American Express is user acceptance. "This is hardest on the users," he said. "It crosses over several user boundaries; it affects the field offices, operations people, data entry people and others."

It not only changes employees' jobs, it changes the way they interact, he added. Some workers, for example, are only accustomed to using paper documentation and have to be trained to use computers. Therefore, the people side of the changeover is taking longer than six months to implement.

Analysts added that another problem with imaging in LANs is lack of standardization.

Early imaging systems were based on stand-alone machines, and many imaging vendors still offer complete systems comprising proprietary hardware and software. These vendors are just now bringing out products that work with existing or standard LAN platforms, such as NetWare and Microsoft Corp. Windows.

There is no such thing as a totally open imaging application, said Ajit Kapoor, vice-president and director for image management strategies at the META Group in Westport, Conn. "Most image applications still rely on proprietary platforms."

According to IDC/Avante's McCready, there are standards that specify a file format for images but each vendor generally implements the standard differently, making the systems incompatible.

Finally, analysts warn administrators about network bottlenecks caused by imaging on LANs.

"Putting imaging on your LAN is like cramming a tennis ball into a funnel," said Pam Bliss, a senior analyst for document imaging management system services at Dataquest. Administrators cannot implement imaging on existing LANs without expecting performance degradation.

For starters, a single-image document can be as long as 150K bytes, compared to a typical text document consisting of only a few kilobytes. "Even compressed, images have about 50K [bytes] of data," Hudson said. "It's a completely different beast." To compensate for that, Morrow suggested making the packet sizes as large as possible, which is accomplished through the net drivers.

More may be involved, however. "Imaging may require a review of the network topology," Kapoor said. That topology will be dictated by the frequency of the image transfers and the size of the files.

"If you're going to have four or five people accessing the image system every 15 minutes, you won't see much of a change in throughput," Kapoor said. In such a case, a topology change would probably not be necessary. "But if you have 30 or 40 people running imaging applications every 30 seconds," he said, "you're putting a pretty heavy load on your network."

HP unveils enhancements

continued from page 17

possible for users to build icons that, for example, enable them to transparently invoke the commands needed to start up a spreadsheet application on one server, retrieve data used to assemble the spreadsheet from other servers and display the resultant information on screen.

NewWave Office 3.0 supports a new feature that enables users to create objects that automate work flow. For example, users can create an object that passes a completed report via electronic mail to a manager for approval.

HP also introduced a version of Novell, Inc.'s Portable NetWare that enables its Unix-based HP 3000 and HP 9000 minicomputers to act as servers for microcomputers running NewWave Environment. NetWare for the HP 3000 costs between $5,900 and $31,200.

HP additionally introduced a version of LAN Manager/X that enables HP 3000 minicomputers running HP's MPE/XL operating system to act as NewWave Office servers. The LAN Manager/XL Named Pipes software costs between $1,700 and $11,100, and includes a tool kit supporting development of client/server applications using Microsoft's Named Pipes transport protocol.

HP's ARPA Services 2.1 for NetWare, another package added to NewWave Office 3.0, enables clients running NetWare to utilize Transmission Control Protocol/Internet Protocol and HP's Network Interprocess Communication protocols to run NewWave Office 3.0 client/server applications.

HP also bolstered NewWave's E-mail capabilities with a $2,395 version of its HP OpenMail for servers running The Santa Cruz Operation, Inc.'s (SCO) Unix System V Release 3.2. The package enables clients attached to SCO Unix-based servers to exchange E-mail.

Another new E-mail package, HP NewWave Mail, enables clients running the NewWave Environment to access HP OpenMail or DeskManager E-mail services running on servers. The package costs between $170 and $195.

Also introduced as part of NewWave Office 3.0 were:

- HP Software Vendor, a $7,995 package that enables users to load an application on a NewWave server and electronically distribute copies of it to a specified number of clients.
- HP NewWave Access, which costs between $265 and $295, enables NewWave clients to transparently extract data from minicomputer-based HP TurboIMAGE, HP Allbase/SQL and Oracle Corp. data base management systems, as well as data stored on other microcomputers.
- HP AdvanceLink for NewWave/Windows, a $263 to $299 package that enables NewWave Environment clients to emulate HP and Digital Equipment Corp. terminals. This package can also run under Windows on microcomputers that do not run NewWave Environment.

Netnotes

continued from page 17

DOS provides Transmission Control Protocol/Internet Protocol support for DOS and Microsoft Corp. Windows 3.0. BW-NFS for LAN Workplace adds NFS client software.

BW-NFS for LAN Workplace supports Unix file protection and DOS file locking and sharing. The software operates on both Ethernet and token-ring networks.

BW-NFS for LAN Workplace costs $245.

Triticom last week announced enhancements to its line of LANVision Traffic Monitor software, which includes EtherVision, TokenVision and ArcVision.

The LANVision series is designed to monitor low-level activity — such as network utilization and error logging — on any Ethernet, token-ring or Arcnet LAN, no matter what operating system is in place, according to the company, based in St. Paul, Minn.

The new versions are dubbed 2.0 and can generate hard copy reports to summarize results of a monitoring session.

All three versions of the software now support Micro Channel Architecture local-area network adapters in the monitoring station.

ArcVision 2.0, EtherVision 2.0 and TokenVision 2.0 are all available now for $295, $395 and $495, respectively.

MANAGEMENT STRATEGIES

MANAGING PEOPLE AND TECHNOLOGY: USER GROUPS AND ASSOCIATIONS

Dialogue

Do you think most users have implemented sufficient security features in their networks?

“No. We've taken great pains to ensure that we have more than adequate security in our network because of the nature of our business. But I learned at a recent user group meeting that most network managers don't consider security a priority.

“I think this is a result of lack of experience and/or dollars. While most gave lip service to the importance of security, they hadn't done much more than implement very elementary security features.”

Chuck Garrison
Vice-president of telecommunications
Chicago Board Options Exchange
Chicago

“No. But at the same time, I don't want to see too much security. You can safeguard [the net] so much that no one can [use] it.

“From a user's perspective, it's getting increasingly difficult to get in and use systems. But from a management standpoint, the security is too important to neglect. It's a matter of striking a good balance.”

Steven Archer
Telecommunications supervisor
Hewlett-Packard Co.
Colorado Springs

“Of course, the ultimate safeguard would be to encrypt [traffic over] the network. Most companies don't do that, but I believe other safeguards are implemented. Many companies may not have adequate security, but they think they do.”

Patrick O'Haren
MIS manager and
vice-president of computing
and telecommunications
National Semiconductor Corp.
Santa Clara, Calif.

“No. Security often only becomes an issue after a breach occurs and data is corrupted. When installing a network or network-based applications, the concern is for ease of use and user-friendliness, which is almost diametrically opposed to proper security procedures.”

Patrick Springer
Director of industry services
Telecommunications
Management Consultants
Needham Heights, Mass.

SME charters new group to explore network issues

Strategy is to foster net expertise in manufacturing.

By Wayne Eckerson
Senior Editor

DEARBORN, Mich. — Recognizing the growing importance of networking to manufacturing competitiveness, the Society of Manufacturing Engineers (SME) recently established a new group designed to help users apply network technology and computer-integrated manufacturing (CIM).

SME's Networking and Communications in Manufacturing Group, which is open to all SME members, is intended to help engineers and managers gain a better understanding of network technologies and how to apply these technologies in a manufacturing environment.

“Many [manufacturing companies] recognize the need to implement networks to achieve strategic objectives but lack the expertise to make it happen,” said James Ames, chairman of the new group and senior research associate at the CIM Systems Research Center at Arizona State University in Tempe, Ariz. “This group is the vehicle by which companies can get the information they need to solve their connectivity problems.”

In many manufacturing companies, the person responsible for building or managing a local-area network or establishing communications with an overseas plant has not had formal training in communications, Ames said. These people either volunteer for the assignment or are handed it.

Ames said the group will initially focus on several issues. These include global communications, data security and implementing factory local networks.

The group also plans to publish a number of items, including an engineer's guide to networking and communications, a bibliography of articles on networking and CIM, and case studies of net implementations in manufacturing firms. It also plans to hold networking clinics at Autofact '91 and other manufacturing conferences sponsored by SME.

While many firms are eager to become world-class manufacturers, few are making significant headway toward achieving their objectives, Ames said. The main problem is that firms have not made networking an integral part of their strategic plans.

“Many companies want to pare management levels and become more closely integrated,” he said. “But this can't be done without a good network and a commitment to CIM.”

The group's next meeting is scheduled for June 7 at SME headquarters here. For more information, call Nancy Mauter, group administrator, at (313) 271-1500, Ext. 523. ◪

EXECUTIVE BRIEFS

BY WAYNE ECKERSON

Pursuing quality. To make total quality management principles relevant for information systems (IS), the Society for Information Management (SIM) recently established four regional working groups to investigate ways in which IS operations can implement programs designed to foster a greater commitment to quality.

SIM is a nonprofit organization of senior IS executives with more than 1,600 members worldwide and 44 chapters in the U.S.

The four working groups are located in the Northeast, Eastern Seaboard, Midwest and West Coast regions. Each of the groups has two major objectives: to define the best practices available for implementing total quality principles in an IS organization and to determine how companies can leverage information technology to help them advance the cause of total quality.

Each group will consist of between 20 and 30 representatives from academia and business. The groups will meet for approximately 18 months, after which time they will publish their findings in a white paper.

For more information, call SIM headquarters in Chicago at (312) 644-6610. ◪

Network applications consortium

Founded: February 1991

Members: Thirty charter members representing 23 large corporate and government user organizations.

Purpose: To speed development of applications capable of operating effectively across an enterprise network.

Steering committee members:

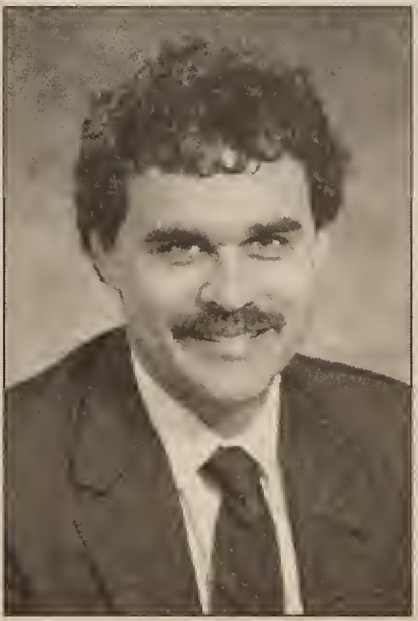
Arthur Beckman	Pacific Gas & Electric Co.
Michael Housley	Arizona Public Service Co.
Michael Kinsey	Pennsylvania Blue Shield
Brian Plackis	MCI Communications Corp.
John Ryan	Compaq Computer Corp.
Richard Schell	The Turner Corp.

GRAPHIC BY SUSAN J. CHAMPENY SOURCE: NETWORK APPLICATIONS CONSORTIUM, SAN FRANCISCO

User forms group to spur net applications

Frustrated by lack of applications for large LANs, PG&E's Beckman sets out to speed development.

Q&A Last winter, Arthur Beckman began contacting other local-area network users to find out whether they were also experiencing what had become an enormously frustrating problem for him — namely, a lack of applications designed for large LAN installations. Beckman, manager of information technology services, oversees a 12,000-node LAN for the Pacific Gas & Electric Co. (PG&E).


Arthur Beckman

Discovering that other users shared his concerns, Beckman spearheaded the formation of the Network Applications Consortium (NAC), a group of largely Banyan Systems, Inc. customers that are working to speed the development of client/server applications for large personal computer networks.

The group recently drafted a charter and will hold its first formal meeting next month. In addition to PG&E, the organization includes 30 charter members representing 23 large corporate and government users. (Anyone interested in joining the consortium may call (415) 973-6434 for more information.)

Beckman, NAC's chairman, recently spoke with *Network World* Staff Writer Maureen Molloy about the key issues the group hopes to tackle.

How was the NAC formed?

I began experiencing frustration [because] there aren't a lot of applications capable of running across a large local- and wide-area network environment. I was curious to find out if other large networking users had the same concerns so I wrote a letter to about 30 different companies.

Almost all of them outlined the same frustrations I was having — basically [expressing concern about] how far behind software was lagging in the LAN/WAN environment.

I asked them if there was something they wanted to do about it, and the overwhelming response was yes.

The aim [of the consortium] is to band together to identify the primary applications that users of enterprise networks need and to work at making those applications become a reality.

What are the applications?

The No. 1 application that came out was data base front- and back-end tools supporting a client/server architecture.

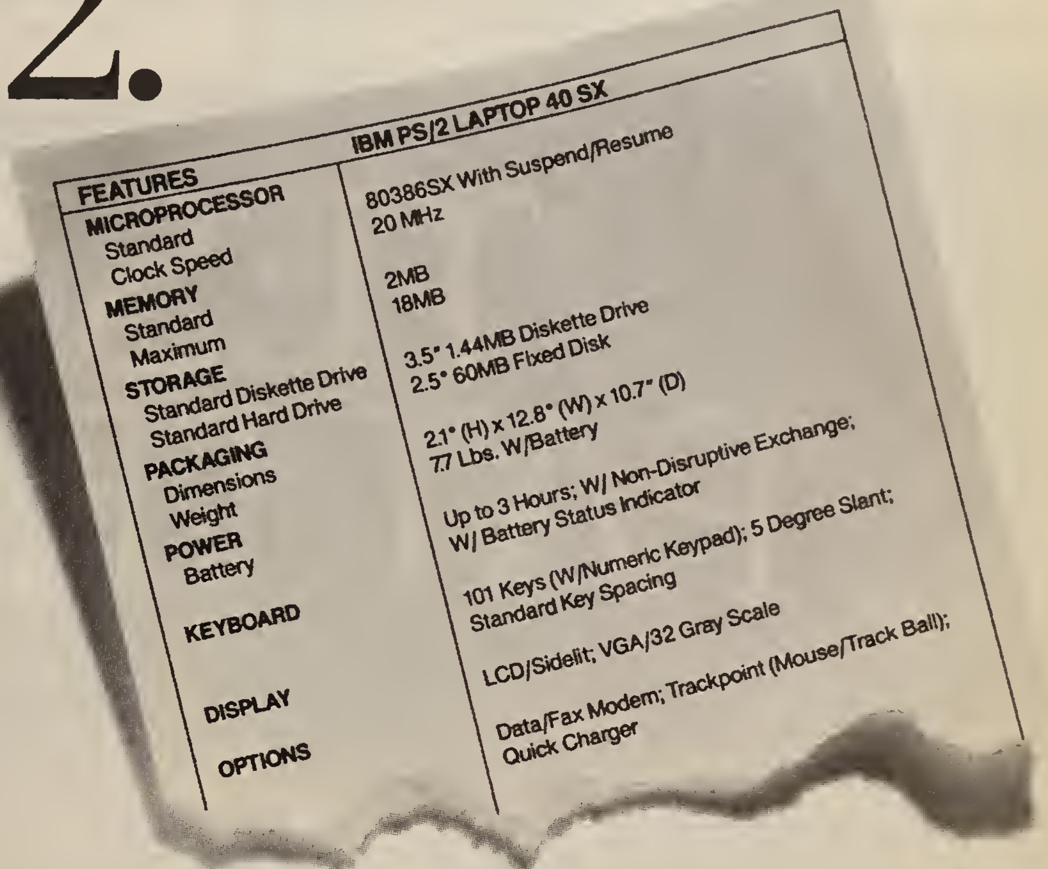
The next most important [application] was network management tools, followed closely by base network operating system improvements.

One such improvement would be interoperability between dif-

(continued on page 24)

The body of
The heart and

a laptop.
soul of a PS/2.



FEATURES	IBM PS/2 LAPTOP 40 SX
MICROPROCESSOR	
Standard	80386SX With Suspend/Resume
Clock Speed	20 MHz
MEMORY	
Standard	2MB
Maximum	18MB
STORAGE	
Standard Diskette Drive	3.5" 1.44MB Diskette Drive
Standard Hard Drive	2.5" 60MB Fixed Disk
PACKAGING	
Dimensions	2.1" (H) x 12.8" (W) x 10.7" (D)
Weight	7.7 Lbs. W/Battery
POWER	
Battery	Up to 3 Hours; W/ Non-Disruptive Exchange; W/ Battery Status Indicator
KEYBOARD	101 Keys (W/Numeric Keypad); 5 Degree Slant; Standard Key Spacing
DISPLAY	LCD/Sidelit; VGA/32 Gray Scale
OPTIONS	Data/Fax Modem; Trackpoint (Mouse/Track Ball); Quick Charger

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Making a computer light enough to take anywhere and small enough to sit on a lap isn't enough. Making it perform like one that sits on a desk is the true challenge. That's why IBM has created a computer that delivers true portability without sacrificing true performance—the Personal System/2® Laptop 40 SX. At just 7.7 pounds it's clearly a lightweight computer. But it certainly doesn't act like one.

DESKTOP PERFORMANCE, WITHOUT THE DESK.

The PS/2® Laptop looks great from the outside. But its true beauty lies inside, where you'll find uncompromised computing power. It has the same 386SX™/20 MHz processor found in best-selling desktop models. A 3.5″ 1.44MB disk drive and 2.5″ 60MB fixed disk provide fast access to programs and data, and standard 2MB RAM is expandable to 18MB.

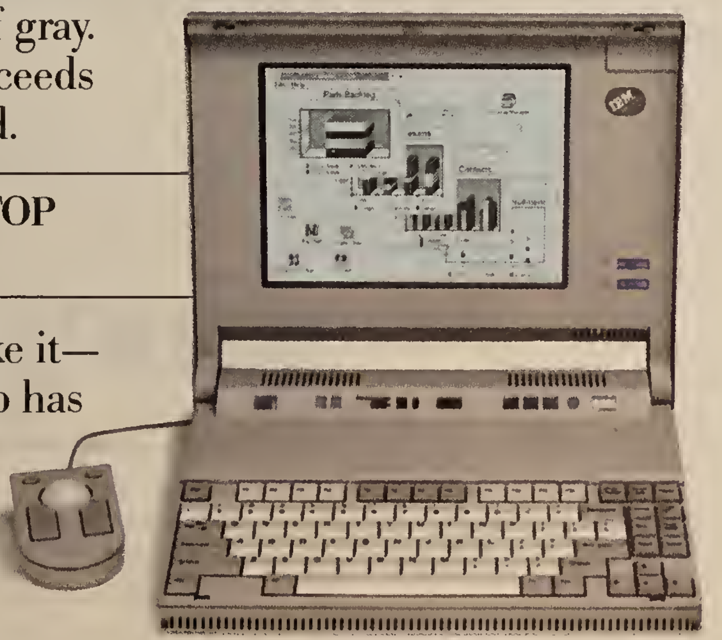
Instead of compromising comfort by altering the keyboard, the PS/2 Laptop has a full-size keyboard spaced and arranged the same way as a desktop PS/2's. And instead of squeezing information onto a pint-size screen, it has a sidelit LCD that offers a 10″-diagonal viewing area. It delivers sharp, clear text and graphics with VGA quality in 32 shades of gray. With so much to offer, the PS/2 Laptop succeeds at being small, without being small-minded.

THE PS/2 LAPTOP IS ONE LAPTOP NOT TO BE TAKEN LIGHTLY.

IBM knows it's not how small you make it—it's how you make it small. The PS/2 Laptop has system status icons that monitor assorted functions and battery life. Extensive power management controls include the ability to change batteries in the middle of an application without exiting and a special feature that suspends power when the screen is closed, then returns to full power when reopened, resuming applications where they were left off without the need to save to the hard drive.

Of course, it comes with an AC adapter, and a 2400 BPS Data Modem/9600 BPS Fax Modem is available, as well as a special mouse that doubles as a trackball when turned over. And the PS/2 Laptop comes with something no laptop should be without—an international warranty* backed by thousands of Authorized Remarketers worldwide, so service and support are never far away.

To find out more, contact your IBM Authorized Remarketer or IBM marketing representative. You'll see why with the new PS/2 Laptop, you don't need a whole lot of room to get a whole lot of computer.



How're you going to do it?

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Group to spur net applications

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ferent client workstations. Everybody wants to integrate multiple types of front ends — DOS, [Microsoft Corp.] Windows, OS/2, Unix, Mac.

What steps has the consortium taken since the initial meeting?

In February, we met in Houston to draft a charter. We also started forming special interest groups that will [focus on] specific applications that need to be developed.

What is the consortium's charter?

Our mission, in a nutshell, is to improve the infrastructure of enterprise networks and increase the availability of vendor-supported applications.

There are three specific goals: One is to influence the design, development and testing of the VINES operating system, as well as associated tools and software.

Another is to influence the design, development, VINES integration and testing of LAN/WAN applications. And lastly, to share the information strategies and goals between companies that have a common vision of the LAN as the fundamental building block for enterprisewide connectivity.

Has there been a lot of interaction among the members yet?

Yes. We're literally spread out across the country, and in the beginning, we kept in touch through correspondence and phone calls, but it just wasn't working well.

But we've recently interconnected our steering committee members through Lotus [Development Corp.'s] Notes. [Notes is a groupware application that allows users on multiple LANs to share documents and exchange electronic messages.] This has been a tremendous plus because it allows us to keep each other up to date on what we're discovering about the various applications and vendors.

The Notes forum will be an important milestone for the consortium because it will create a data base describing applications of interest and will allow members to discuss technical issues and strategies.

Besides PG&E, who are some of the other members?

The current membership represents an installed base of over 2,500 servers and 75,000 client nodes.

Some of the members include Arizona Public Service Co., Compaq Computer Corp., Intel Corp., Martin Marietta Corp., MCI Communications Corp., Pennsylvania Blue Shield and The Turner Corp.

Our aim is to have 30 active members, with a limit of one voting member per company. Other organizations can join later as information-only members who will be informed on the group's progress and be used as a base of information to define requirements and set directions.

Part of our mission is to keep the group small because we believe that strategy will be more effective in achieving our goals.

But what about power in numbers to help persuade vendors to develop the products you need?

Our feeling is that the 23 current members are large enough users that, when taken together, our voice will count. When you bring together the largest 20 to 30 networking companies, [you are] talking about 300,000 to 500,000 nodes over the next couple of years. We feel that's enough to start turning some heads.

There's a slew of potential problems that arise when you have too many active members — the problem of just trying to get together, too many different opinions, and so on — that it could actually harm our effectiveness.

Have you spoken with any vendors yet?

We've made some informal contact through publications — letting them know of the existence of the consortium. At our

(continued on page 60)

TEST PATTERN.
MultiModem224E
MultiModemV32
PC MAGAZINE EDITORS' CHOICE May 12, 1987 MultiModem224E MT224EH
PC MAGAZINE EDITORS' CHOICE December 11, 1990 MultiModemV32 MT932EAB

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PC Magazine, 12/11/90 (Ziff-Davis Publishing) "9600-BPS MODEMS: Breaking the Speed Barrier-PC LAN Labs tests seven rapid-fire modems complying with V.32, V.42 and V.42bis standards."

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INTERNATIONAL NETWORKS

USER STRATEGIES, INTERNATIONAL SERVICES & REGULATION

Worth Noting

The North Pacific Cable, a major fiber-optic cable linking the U.S. and Japan, is now scheduled to begin operations in May rather than this month as previously scheduled. The delay is due to technical problems on a leg of the system extending to Alaska.

World News

AT&T recently petitioned the Federal Communications Commission for approval to purchase capacity on three major international fiber-optic cables in Africa, Asia and Europe.

Specifically, AT&T asked to purchase capacity on the Southeast Asia-Mediterranean-Europe 2 Cable System (SEA-ME-WE 2), the Europe-Africa Cable System (EURAFRICA) and the U.K.-Belgium 6 Cable System (UK-BEL 6). In its petition, AT&T said it would use the digital capacity it is purchasing to supplement existing analog, voice-grade capacity.

Specifically, AT&T said it would use capacity on SEA-ME-WE 2 to extend circuits from the Trans-Atlantic Telecommunications-8 (TAT-8) and TAT-9 cables to Cyprus, Djibouti, Egypt, India, Indonesia, Saudi Arabia, Sri Lanka, Syria, Turkey and Yemen. AT&T said it would pay approximately $2.63 million to purchase the SEA-ME-WE 2 capacity.

AT&T said it would use capacity on the EURAFRICA cable to extend TAT-8 and TAT-9 circuits to Morocco and Portugal. The carrier said it would pay approximately $587,000 for the EURAFRICA capacity.

AT&T would use the UK-BEL 6 capacity to extend TAT-8 and TAT-9 circuits to Belgium, Germany and Switzerland. It said it would pay approximately $7.6 million for the UK-BEL 6 capacity.

Spanish carrier pares rates for switched service to U.S.

Move to make Spain a more viable global hub.

By Barton Crockett
Senior Editor

NEW YORK — Spain's monopoly carrier, Telefonica de Espana, last week reduced prices for switched services to the U.S. by 22% and formally opened its first office here.

The price cut, which is expected to be followed by similar reductions in international private-line prices, is designed to make Spain more competitive as an international hub for users, according to Adolso Suarez, general manager of the carrier's new U.S. division, Telefonica USA, Inc.

Suarez said these efforts will be aided by the new office, which will enable Telefonica to do a better job supporting the needs of Spanish and U.S. users.

"The main purpose of opening this office is to bring Telefonica closer to its customers," Suarez said.

About 100 Spanish and U.S. companies purchase international business services between the U.S. and Spain, including international private-line, satellite broadcasting, videoconferencing and toll-free dialing services, Suarez said. The price cut will help increase the number of international network service users between the U.S. and Spain, he added.

Effective last week, Telefonica reduced the cost of international calling services from Spain to the U.S. from 365 pesetas ($3.56 U.S.) per minute between 8 a.m. and 10 p.m. to 285 pesetas ($2.77 U.S.) during the same period.

Since international private-line tariffs are based on switched service tariffs, Telefonica also will reduce international private-line tariffs, Suarez said. Currently, Telefonica charges 900,000 pesetas ($8,766 U.S.) per month for the Spanish half of a 64K bit/sec private line to the U.S., more than twice the rates charged by national carriers in Belgium, France, Germany, Switzerland and the U.K. for the half of a circuit between the U.S. and those countries.

But Suarez said those tariffs are misleading because Telefonica regularly offers steep discounts of as much as 50% on its international private-line services.

Suarez explained that international tariffs are being reduced across the board to lessen the degree to which international service revenues subsidize domestic services.

He added that Telefonica plans to invest $24 billion through 1993 in new facilities that will further increase Spain's attractiveness as a hub site.

Report claims Hong Kong carrier overcharges users

HONG KONG — A report on international telecommunications services here claims users could be paying as much as 50% more than they should for international voice and data services, and urges officials to abolish the monopoly stranglehold on the telecom market.

The report, "International Telecommunications in Hong Kong: The Case for Liberalization," by Milton Mueller, a research associate at the International Center for Telecommunications Management at the University of Nebraska in Omaha, claims the colony's monopoly international carrier, Hong Kong Telecommunications International, is earning profits of 60% to 70% on international services.

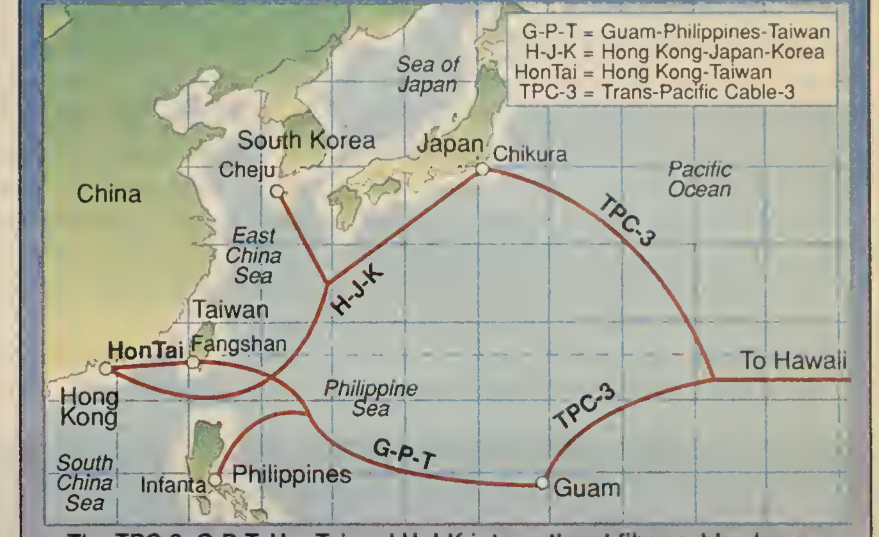
In his report, which was released earlier this year, Mueller claims users of international services here are paying 40% to 50% more than they should be paying, or a total of $195 million to $260 million more per year.

Mueller argued that competition is needed to reduce these charges and to improve Hong Kong's global competitiveness. But Hong Kong must act before 1997; otherwise, control of the colony will revert to the communist People's Republic of China and the chances of international competition ever arriving will be remote.

"Hong Kong can either choose to take bold measures, which can make it a regional leader in the area, or it can fail to act and watch the rest of the world pass it by," the report stated.

The report was published in January on behalf of the Hong Kong Centre for Economic Research.

The South Pacific's redundant fiber loop



The TPC-3, G-P-T, HonTai and H-J-K international fiber cables have been configured into a redundant loop that enables carriers to restore a handful of DS3s via fiber facilities after an outage.

GRAPHIC BY SUSAN J. CHAMPENY SOURCE: PACIFIC TELECOM CABLE, INC., VANCOUVER, WASH.

US Sprint trails AT&T in int'l fiber backup

AT&T's early connections force US Sprint to back up services with less reliable satellite links.

By Barton Crockett
Senior Editor

As the dream of a fully redundant, global fiber-optic network comes closer to reality, US Sprint Communications Co. appears to be suffering a competitive disadvantage relative to AT&T.

AT&T and monopoly carriers abroad are cooperating to build a global, self-healing fiber-optic network but are loath to relinquish a competitive advantage by letting US Sprint in on the deal.

US Sprint consequently is being forced to rely on satellite services to back up most of its international fiber services. AT&T, by contrast, plans to back up nearly all of its global fiber services via fiber-optic cables by 1995.

"From my perspective, the cable that has to use satellite for backup will be at a competitive disadvantage," said William Coopman, manager of telecommunications at Deere & Co. in Moline, Ill. "Many applications can be sensitive to satellite propagation delay, so users want to avoid that where they can." Currently, nearly all international fiber is backed up via satellite.

AT&T strides ahead

AT&T's advantage could develop during the next few years as the carrier moves aggressively to construct its global, self-healing fiber-optic network.

Later this year, for example, AT&T expects to cut over a fiber cable called Trans-Atlantic Telecommunications-9 (TAT-9) that will be used to provide transatlantic network services to users and to back up a portion of capacity on TAT-8, the only other transatlantic fiber cable AT&T currently operates.

AT&T has another fiber cable scheduled for completion in August 1992, called TAT-10, that will be able to back up a portion of TAT-9 and TAT-8.

TAT-11 and TAT-12, scheduled for installation in 1993 and 1995, respectively, will further increase AT&T's Atlantic fiber redundancy. By 1995, virtually all of AT&T's transatlantic fiber circuits will be backed up by fiber, according to Frank Fahey, AT&T's director of international facilities management.

These plans are mirrored in the Pacific. For example, in October 1992, AT&T plans to cut over a fiber cable called Trans-Pacific Cable-4 (TPC-4) that will be used to provide services to users and to back up a portion of capacity on Hawaii-4 (Haw-4)/TPC-3, the only other transpacific fiber cable system AT&T currently operates.

Those two cable systems will be followed in 1995 by an innovative cable system, TPC-5, that will be fully redundant from the start and will be able to back up AT&T's other two transpacific cable systems.

TPC-5 will consist of two 4.8G bit/sec fiber-optic cables running over separate routes between California and Japan. Because each TPC-5 cable will be loaded no more than 50%, it will be fully redundant.

Also, spare capacity on TPC-5 will be able to back up TPC-4 and Haw-4/TPC-3 because of TPC-5's immense capacity. Fahey said TPC-5 will support more capacity

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Voice response units win place in the sun

continued from page 13

cations have drawn large users to voice response technology, according to speakers at the conference.

Charles Schwab & Company, Inc., the nation's largest discount broker and a voice response pioneer, uses the technology to support a telephone trading service called TeleBroker.

The service enables customers to trade stocks and securities, obtain stock quotes and check account balances. TeleBroker is supported from voice response units in AT&T's network.

Use of the service has enabled the company to reduce by one-third the number of calls that must be handled by call center agents.

"It's much cheaper for us to add excess capacity through automation than it would be to add bodies and buildings," said Barbara Rip, vice-president of marketing and sales for Charles Schwab. The $626 million discount broker already has more than 130 branch offices nationwide.

"[Voice response units] are more efficient and provide better information quicker than customer service representatives," Rip said. "And customers get instantly addicted to [that higher] level of service."

Customer response to TeleBroker has been overwhelming. During a trial of the service, large numbers of customers began seeking access to the service after hearing from participants how easy and efficient it was, she said.

Charles Schwab rival Fidelity Investments also uses voice response systems as the foundation for a telephone-based trading service called Fidelity Automated Services Telephone (FAST), which was launched in 1984.

The service enables customers to obtain stock and mutual funds quotes as well as check their account balances.

But FAST stumbled at the gates. "You needed a manual to use it. It wasn't menu-driven or easy to use," said Stuart Greenberg, vice-president of strategic business systems with Fidelity Investments. The service was made simpler and is now used widely by Fidelity customers. "It's been an enormous success."

Greenberg said properly architected voice response applications will be used heavily. "We determined [that] making FAST easy to use would be the main incentive for customers to use it."

Beats ANI hands down

Companies with customer service, order entry or telemarketing centers say voice response units are a more effective and less expensive means of initiating data base lookups for transaction processing than the automatic number identification (ANI) feature of Integrated Services Digital Network.

ANI only provides the main billing number of the location from which the customer calls. The technology cannot often identify customers calling from behind a switch.

Having callers key in an identifier can help users avoid the customer concerns about privacy that surround ANI. "If customers are willing to enter an account number, there is no issue about their privacy being invaded," said Richard Rabin, vice-president of Vanguard Communications Corp., a Morris Plains, N.J., consulting and research firm specializing in voice processing.

Voice response units can also be used in places where ANI is not available or where upgrading a premises switch to support ANI is cost-prohibitive.

Rabin said business units within many companies are now coming to telecommunications managers with new applications for the devices.

"In a growing number of cases, voice response use is driven by the [line of business] within a company that needs it, not by telecommunications or MIS," Rabin said. He noted that many voice reponse applications are tasks not usually performed over the telephone. "They're being used for applications like checking account balances and college course registration." ◼

Row over broadcast rules causes concern

continued from page 13

son the decision-making process and subvert the statutory requirement that decisions be based on the record," Dingell said. "I am disturbed that our confidence in this commission may have been misplaced."

Sikes is seeking the largest onetime budget increase in the agency's history in order to beef up enforcement and tariff processing operations and to modernize and expand the agency's computer system. He is asking for $133.5 million for fiscal 1992 and $163.5 million for fiscal 1993.

Congressmen voiced their support for the additional funding at the hearing but emphasized that the agency must first prove its seriousness about carrying out its responsibility to protect the public interest.

Rep. Dennis Eckart (D-Ohio) also said he was disappointed with the FCC's handling of the syndication issue and questioned FCC commissioners about how strongly they believe they have "a significant independent public trust to uphold.

"Part of my concern is the efficacy of the FCC to meet the public interest test that is at the core of the [Communications Act of 1934]," Eckart said. ◼

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U 11/02 |4  |BIT ERROR RATE ABOVE THRESHOLD                     |Location*1
U 11/02 |1  |BOARD DOWN                                         |Mux*Loc2
U 11/02 |1  |BOARD DOWN                                         |Mux*Loc2
U 11/02 |1  |BOARD DOWN                                         |Mux*Loc2
A 11/02 |2  |BIT ERROR RATE ABOVE THRESHOLD                     |Mux*DC
U [illegible]
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PRODUCTS & SERVICES

THE LATEST OFFERINGS FROM VENDORS AND CARRIERS

First Look

UB serves up emulation link to Tandem hosts

Ungermann-Bass, Inc. last week unveiled software that connects terminals, personal computers and Apple Computer, Inc. Macintoshes to Tandem Computers, Inc. hosts.

Ungermann-Bass said it embedded support for Tandem's 6530 terminal protocols into the company's Transmission Control Protocol/Internet Protocol stack running on its ASM100 terminal server module for its Access/One intelligent wiring hub, its NIU190 stand-alone asynchronous terminal server and on client workstations in local-area networks.

The enhancements to the terminal server products enable users to communicate in native 6530 formats, rather than as asynchronous terminals linked to the host.

The vendor also added 6530 support to the TCP module running on personal computers and on its MacUWS package for Macintoshes.

Personal computers must also use a 6530 emulator, such as Tandem's PC6530 package, to establish an emulation session with the host. Macintoshes can use the 6530 emulator in MacUWS to establish 6530 sessions.

The software enhancement, which will ship in April, is available at no extra cost.

Ungermann-Bass, Inc., 3900 Freedom Circle, Santa Clara, Calif. 95054; (800) 873-6381.

Webcorp bundles data compression into NOS

Webcorp recently rolled out its **WEB 2.55** network operating system, adding real-time data compression to the software to boost data throughput on local-area networks.

Webcorp said the addition of data compression to its operating system will enable users to achieve throughputs in excess of standard 10M bit/sec Ethernet rates.

WEB 2.55 is available now. It is priced at $495 for a five-user license, $995 for a 15-user license and $1,495 for a 30-user license.

Webcorp, 3000 Bridgeway, Sausaltito, Calif. 94965; (415) 331-1449.

Novell airs high-speed LANalyzer

By Caryn Gillooly
Senior Editor

SAN JOSE, Calif. — Novell, Inc. recently released a version of its LANalyzer network analyzer that will let local-area network administrators troubleshoot and gather statistics from both 4M and 16M bit/sec token-ring LANs.

Novell is also offering a version of the software that can monitor both Ethernet and token-ring environments from a single personal computer.

Novell said it ported the LANalyzer software to run on a 4M/16M bit/sec token-ring adapter, which when housed in a personal computer, turns the device into a LAN analyzer.

"There is a strong overlap between the true-Blue market and the Novell market, and a lot of [IBM] customers are going to 16M [bit/sec]," said Duane Murray, vice-president and general manager of Novell's LANalyzer products division here.

The new version will include all the features found in the older 4M bit/sec version, such as predefined token-ring test applications. One such application is automatic network mapping, a feature that generates a list of all nodes on the token-ring net in sequential order to help administrators pinpoint the source of a network disruption.

The 4M bit/sec version will be phased out over time, according to a Novell spokesman.

The primary advantage of the tests is that they have been predefined; administrators must select only the criteria and parameters. Other LAN analyzers require the administrator to be familiar with the protocols and know how to read the protocol data gathered in order to locate network problems.

The new LANalyzer version not only conducts predefined tests, but suggests a next step to administrators once test results are gathered.

The LANalyzer 4/16 is available now for $11,980.

According to Novell, customers currently using the 4M bit/sec version can upgrade to the LANalyzer 4/16 for $1,995 until May 15.

The LANalyzer Ethernet/16, which combines Ethernet and 16M bit/sec token ring, includes one Ethernet card and one token-ring card, as opposed to two token-ring cards. It is available now for $19,995.

For further information, contact Novell at 2180 Fortune Drive, San Jose, Calif. 95131, or call (800) 243-8526.

GUPTA pack gives users access to SQL Server data

By Timothy O'Brien
West Coast Bureau Chief

MENLO PARK, Calif. — GUPTA Technologies, Inc. recently announced SQLRouter/SQL Server, software that enables users working with GUPTA's SQLWindows applications to access data on Microsoft Corp.'s SQL Server.

With this release, GUPTA hopes to ease the development of Windows-based client/server applications that utilize the increasingly popular SQL Server as a back-end data repository.

"Our strategy is to support absolutely all SQL data bases," said Ron Wolf, development manager for connectivity products at GUPTA. With SQLRouter/SQL Server, users of SQLWindows will be able to access SQL Server data in the same way they access data from GUPTA's SQLBase Server, IBM's DB2 and Oracle Corp.'s Oracle SQL.

SQLRouter/SQL Server is software that developers can build into Windows-based client applications. It establishes a connection to SQL Server, operating as a back-end data base engine.

Wolf said SQLRouter/SQL Server provides applications programmers with access to the full range of functions on SQL Server.

With the product, developers working in SQLWindows applications can now take full advantage of SQL Server's stored procedures feature. SQLWindows also supports cursors and front-end result sets in the router, enabling developers to create scrolling and multiple windowed applications.

GUPTA will offer the SQLWindows for SQL Server Connectivity Kit designed for current SQLWindows users that includes five SQLWindows run times and five SQLRouter/SQL Servers for $995. SQLRouter/SQL Server products are expected to be available by May 15.

For further information, contact GUPTA at 1040 Marsh Road, Menlo Park, Calif. 94025, or call (415) 321-9500.

3Com strengthens NetBuilder software

Firm adds internetworking and net management support plus performance-improving features.

By Caryn Gillooly
Senior Editor

SANTA CLARA, Calif. — 3Com Corp. recently bolstered its NetBuilder bridge/router software by adding support for several internetworking and net management protocols and announcing features that improve system performance.

Analysts said the enhancements will enable users to take the first steps toward building complex internetworks that will be easier to manage and more cost-effective to implement.

3Com, based here, released three software products for use on the NetBuilder line: Brouter Software Version 3.0, Bridging Software 4.0, and Brouter Software with X.25 and Frame Relay Enhancements Version 1.0.

Brouter Software Version 3.0 offers two major enhancements. It now supports the Transmission Control Protocol/Internet Protocol's Open Shortest Path First (OSPF) dynamic routing protocol. OSPF replaces the Routing Information Protocol (RIP) used on TCP/IP nets. The second upgrade is IP routing support, which includes IP packet filtering.

OSPF lets the administrator choose routing parameters, such as sending information over the least expensive path or the least congested path. Older RIP-based products transmit information only over the route with the least number of network hops, which are the other routers over which it must cross. And RIP will not route information for more than 16 hops, which limits the size of some internetworks.

OSPF also creates less traffic on the network because routers only send changes to routing tables stored on the net, as opposed to rebroadcasting the entire table, as RIP specifies.

3Com said it has conducted OSPF interoperability tests with Advanced Computer Communications, Proteon, Inc. and Wellfleet Communications, Inc.

The addition of IP packet filtering, according to 3Com, tightens internetwork security by letting the administrator restrict routing information between network segments according to sender and receiver addresses.

In Bridging Software 4.0, 3Com added support for the TCP/IP Point-to-Point Protocol (PPP) and the Simple Network Management Protocol's Management Information Base (MIB)-II in addition to a packet prioritization feature.

PPP is a protocol developed by the Internet Engineering Task Force that specifies a standard method for data transmission across serial lines. Through the use of PPP, bridges from different vendors can send and receive information at different ends of the same serial line. Until now, lack of PPP support meant that 3Com required users to employ its bridges at both ends of a serial connection. Now customers can mix and match different brands of bridges on either end, provided they support PPP.

> Support for MIB-II enables NetBuilder to work with a broader array of net elements.
>
> ▲▲▲

Support for MIB-II enables NetBuilder products to work with a broader array of SNMP network elements than specified under MIB-I. The addition of a bridge packet prioritization feature enables local-area network administrators to specify which types of packets — for example, interactive or file transfer — should have routing priority.

3Com's Brouter Software with X.25 and Frame Relay Enhancements Version 1.0 provides the same bridging and routing functions as Brouter Software Version 3.0 but does so over switched X.25 and frame relay services, 3Com said. These packet-switching capabilities let administrators send information over more affordable public networks instead of requiring customers to use expensive leased lines.

Brouter Software Version 3.0 costs $750, Bridging Software Version 4.0 costs $250, and Brouter Software with X.25 and Frame Relay Enhancements Version 1.0 costs $1,500. All are available now.

For more information, contact 3Com at 3165 Kifer Road, Santa Clara, Calif. 95052, or call (408) 764-5000.

OPINIONS

TCP/IP

BY JOHN ENCK

Time for TCP/IP to go back to sleep

In 1974, I worked at the Department of Defense in the greater Washington, D.C. area. In my job, I used the Transmission Control Protocol/Internet Protocol to access various subcontractor hosts located across the country.

Sitting there at my state-of-the-art Texas Instruments, Inc. Silent 700 teletype, I thought I was riding the wave of the future.

When a government salary freeze compelled me to join the private sector, I continued to pursue networking. I witnessed the rise of Digital Equipment Corp.'s DECnet, IBM's Systems Network Architecture and many other proprietary networking architectures.

Today's TCP/IP seems no different from the TCP/IP used 17 years ago.

▲▲▲

But where was TCP/IP? Why didn't it immediately become a significant player in the networking world? After some thought, I reached these conclusions:

- **The Telnet portion of the TCP/IP suite, which is geared toward terminal handling, was designed for teletypes.** The union of full-screen, forms-oriented data entry and Telnet produced a marriage made in hell, not heaven.
- **TCP/IP's File Transfer Protocol (FTP) puts some hefty responsibilities on the user.** For example, the user must determine if the file is text or binary, if it's in ASCII or EBCDIC, or if it has any other special handling requirements.
- **At the time, data processing could best be described as isolationist.** Putting third-party networking software on a computer — as TCP/IP requires — was regarded as criminal.

Then in the late 1980s, TCP/IP resurfaced with a vengeance. First, TCP/IP simply rode on the coattails of Unix as it traveled back into the spotlight. Shortly after Open Systems Interconnection was pushed out on center stage, TCP/IP was shoved out as an interim step toward OSI functionality.

Surprised to see my old friend in the spotlight, I asked myself one simple question: Is TCP/IP any better today than it was when it was first released some 20 years ago? I have since had numerous occasions to sit down and use TCP/IP in a variety of settings. For the most part, today's TCP/IP seems no different from the TCP/IP I used about 17 years ago.

Having seen no major changes in the protocol, I took a look at the data processing community to see if it had changed dramatically. Are the days of forms-oriented transactions over? No way. Has the end-user community become more technical? Yes and no. The personal computer explosion has pushed technology closer to the user, but many still can't tell a text file from a binary file on a host. Is the isolationist era over? Well, MIS managers are still cautious about which software gets on the machine.

Sure, TCP/IP works. But it takes knowledge and experience to use it productively. I simply can't envision an end user sitting down and being productive in a Telnet or FTP session. So if the purpose of OSI is to make an end user miserable, TCP/IP is an excellent role model.

If, on the other hand, the objective is to forge a new era of interoperability, then I'm in favor of letting TCP/IP go back to sleep for at least another 20 years. ◼

Enck is a network analyst at Forest Computer, Inc., which designs, develops, markets and supports data communications solutions worldwide to organizations that function in multivendor environments.

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EDITORIAL

The significance of NW's first SNMP test

Several vendors have recently delivered products that claim to support a new de facto standard for multivendor net management: the Simple Network Management Protocol (SNMP).

Developed by the Internet community, SNMP defines how net devices exchange commands, alerts and responses. According to its proponents, SNMP will have a major, long-term impact on user networks, and many users are considering buying SNMP products. So we decided to put SNMP to the test.

We're honored that the 66-year-old AT&T Bell Laboratories — birthplace of such inventions as the transistor, the laser, the digital switch and the talking motion picture — agreed to work with us in our SNMP Test Series. They've provided us with unmatched technical expertise in this project. AT&T Bell Labs researchers joined us to help educate the user community about this promising new technology, and we praise them for their efforts.

The first article in the *Network World*/AT&T Bell Laboratories SNMP Test Series begins this week on page 1. It covers bridges with SNMP capabilities and cuts through a tangle of SNMP jargon to explain clearly what this protocol can do, what problems it faces, which vendors have implemented the standard successfully, which SNMP-compliant products are trouble-prone and how users can set up SNMP products with the fewest headaches.

We want to thank *Network World* Contributing Editor Edwin Mier and the team that devised and performed the testing: the AT&T Bell Labs researchers under the direction of both Mier and Fred Henry, a member of AT&T Bell Labs' technical staff. The test bed that Henry and Mier devised shows how bridges would exchange SNMP commands and responses with SNMP management stations in a real-world network.

SNMP has looming competition from Open Systems Interconnection network management protocols. But these may be hard for vendors to implement. Thus, OSI management products may not be available for testing for a couple of years.

During this period, SNMP is likely to play a major role in net management. And so, as a user-oriented network publication, we're pleased to have taken a leadership role in SNMP testing.

We hope you find the first installment of the SNMP Test Series useful, and we welcome your feedback. ◼

OPINIONS

MACROSCOPE

BY JAMES KOBIELUS

Overseeing the many domains of private net mgmt.

Network management has a space-age mystique that often misses reality by a country mile. It suggests images of the National Aeronautics and Space Administration's Mission Control, where rows of technicians track and control events from their management consoles. But most real-world private networks aren't run that way.

Many private nets, like the organizations they serve, are decentralized in structure and operations. Network management responsibilities are often divided among diverse groups, including in-house technical and administrative staff, contractors, vendors, carriers and even end users themselves.

Managing networks involves coordinating these overlapping groups, each with its own responsibilities, concerns, techniques and automated management tools.

Network management domains generally fall into three categories:

- **Platform domains.** Traditionally, network management domains have coincided with distinct hardware, software, transmission and services platforms.

A common example of this is the dichotomy between voice and data nets. Within the voice and data realms, platforms are further subdivided for real-time management purposes into the following domains: equipment or service vendor, equipment type, protocol and geographic reach. Each of these platform-specific management domains has its own support infrastructure that includes in-house technical personnel, vendors and contractors, plus a host of automated management tools.

- **Functional domains.** The industry is currently de-emphasizing the importance of proprietary, platform-specific network management domains.

Increasingly, net managers are controlling the network as a whole — based on integrated tools — rather than as a collection of loosely affiliated subsystems.

Consequently, the network management focus is shifting from a fragmented platform-by-platform orientation, in which there is one management system for multiplexers and another for modems, to an overall functional perspective, addressing network management functions performed in common on all platforms.

> Network management systems will only be as integrated as their human managers want them to be.
>
> ▲▲▲

One way of conceptualizing integrated network management is by functional domains such as those contained in the Open Systems Interconnection Network Management Forum's model: configuration, fault, performance, security and accounting management.

- **Application domains.** With the growth of client/server computing, distributed applications are coming under the network management umbrella. Corporate applications have traditionally resided on single-host platforms and were managed by automated data processing personnel.

However, today's network-enabled applications, such as electronic mail and distributed data base systems, tend to straddle many network hardware, software, transmission and service platforms. These applications require special network management domains that interface with all of the platforms on which they depend.

For example, E-mail systems under the X.400 specification consist of private management domains, such as cc:Mail, Inc.'s cc:Mail and other customer-provided private E-mail systems, and administrative management domains such as MCI Mail, a carrier-provided system from MCI Communications Corp.

Each system manages its own address spaces and corresponding management functions, including data administration, backup, security, troubleshooting, performance tuning, as well as billing and chargeback. End-to-end E-mail application management requires tighter integration between private and carrier E-mail management facilities, as well as links to management utilities on other platforms in the delivery chain.

The industry ideal of integrated, centralized network management can seem far-fetched and utopian when viewed against this stubbornly fractious reality. Network management systems will only be as integrated as their human managers want them to be.

In other private networks, however, there may be clear strategic imperatives favoring integrated network management. In such cases, a feasible near-term solution is often to build an internetwork of platform domains using gateways.

The long-term solution, however, is to build truly integrated network management environments based on shared management protocols, network models and repositories. In a multidomain network management environment, these shared resources become the central utility for coordinating diverse organizations, personnel, functions and management tools. ◻

Kobielus, a contributing editor to Network World, *is a telecommunications analyst with Fairfax, Va.-based Network Management, Inc., one of the largest local-area and wide-area network systems integrators in the U.S.*

"A WISE SKEPTICISM IS THE FIRST ATTRIBUTE OF A GOOD CRITIC," asserts James Russell Lowell. Share your wise skepticism about networking by writing an opinion column.

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If you'd like to write a column, call Alison Conliffe, associate features editor, at (508) 820-7416 or fax your idea to us at (508) 820-3467.

TELETOONS

BY FRANK AND TROISE

RALPH'S TELE-MOTEL
NO VACANCY
OFFICE
OPEN
Here's your key. The modem's down the hall, on the left.

LETTERS

Tracking down Teletoons

Keep it coming! I don't always have time to read the current issue of *Network World*. However, when I do, it is usually pretty informative, not to mention current with what is going on in the industry.

My coworkers and I always find time to look at Teletoons. It seems to make its point consistently well. Is there a way to get all of these little gems from back issues?

Rick Riordan
Telecommunications network specialist
Presbyterian Church Headquarters (USA)
Louisville, Ky.

Editor's response:

There is indeed a compendium of Teletoons. To get a copy, send a check for $5.95 to Network World, The Meadows, 161 Worcester Road, Framingham, Mass. 01701. For orders of 10 or more copies, there is a volume discount of $4.95 per copy.

Or you can order a copy of the Teletoons book by calling (508) 875-6400, Ext. 402 and using your Visa or MasterCard.

Needed: idea exchange

In my opinion, those in the communications industry have for the most part lost the art of asking users the right questions. In fact, I often find our sales and marketing people asking customers, "How many will you need, and how much are you willing to pay?" when they should be saying, "Tell me how you implement the XYZ business application in your company."

The technological explosion that has occurred since divestiture has given us lots of

(continued on page 43)

Network World *welcomes letters from its readers.*

Letters should be typed and double-spaced. Mail them to Editor, Network World, *161 Worcester Road, Framingham, Mass. 01701.*

Letters may be edited for space and clarity.

SNMP
Test Series

Putting SNMP-managed bridges through their paces

CONTINUED FROM PAGE 1

bridges, our objective was to see whether different vendors' SNMP-managed bridges worked with other vendors' SNMP management stations and how differently the various SNMP agents performed.

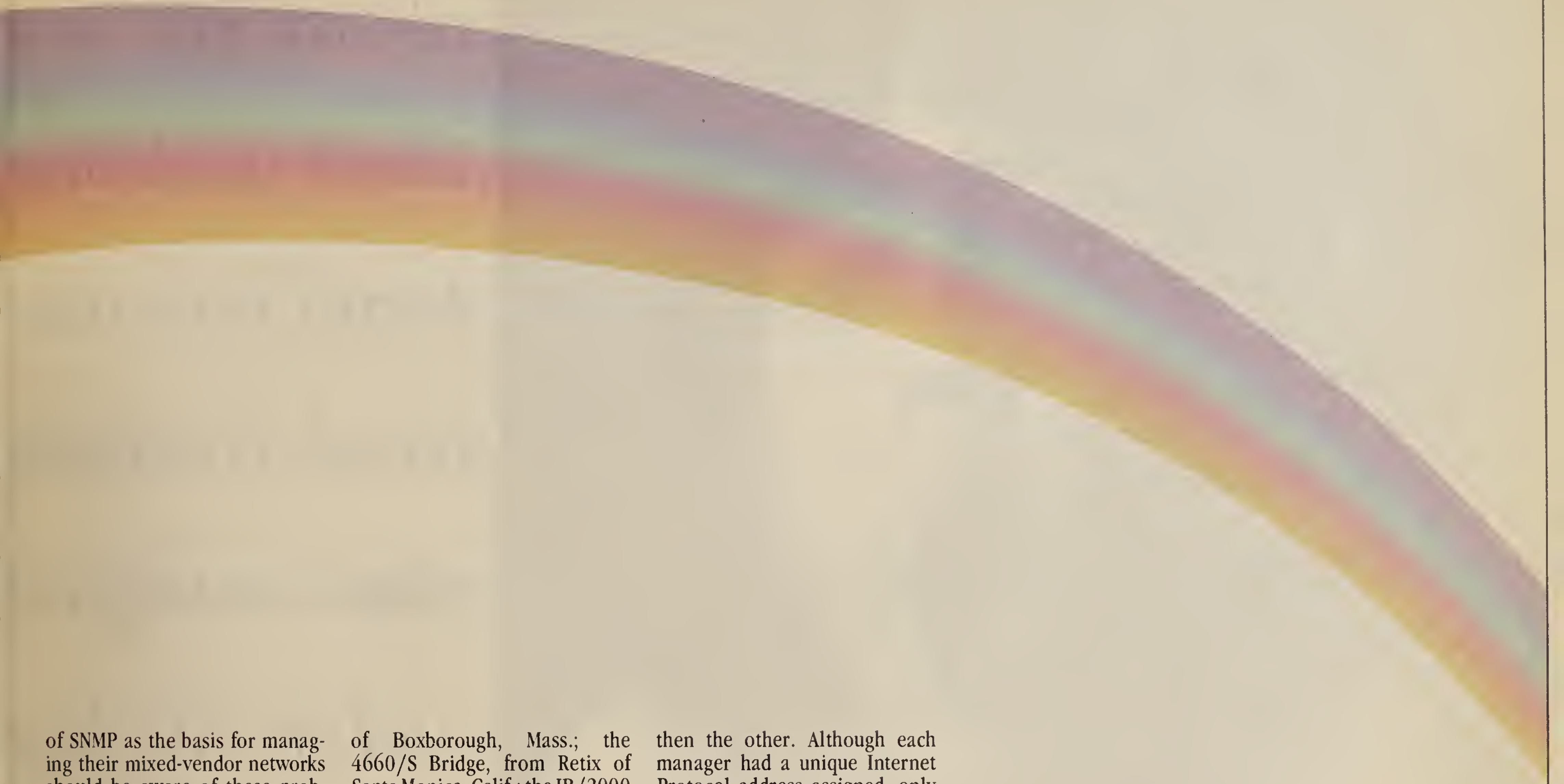
The SNMP standards collectively define the format and structure of information that can be exchanged between agents — which are devices containing SNMP modules — and network management stations. The goal of our test was not merely to find out which, if any, products implemented the best SNMP agents, but also to identify SNMP's general strengths and weaknesses.

Our test environment, designed to simulate a large user organization's net management center, was structured to show how the various products could be integrated into an existing, SNMP-managed, multivendor network.

Seven vendors' off-the-shelf bridges, each with its own SNMP agent, were configured and attached to a thin-wire Ethernet local-area network. Connected to the same LAN segment were two different vendors' SNMP management systems (see Figure 1 on page 34).

On the first attempt, each management station was able to connect with each bridge's SNMP agent, query it and retrieve such rudimentary (albeit critical) management information as the bridge's network ID, the number and type of interfaces it was supporting, and the operational status of each.

But our tests also revealed problems both with particular products and with the standard. Users currently exploring the use



of SNMP as the basis for managing their mixed-vendor networks should be aware of these problems (see "Pitfalls to avoid in your SNMP network," page 34).

Each bridge vendor's SNMP capabilities were evaluated from three perspectives:

- The relative ease of configuring the bridge and its agent for SNMP management, and the scope of SNMP functionality that each supports.
- The consistency and accuracy of the statistics (especially those pertinent to the operation of bridges) that all SNMP agents are supposed to collect and furnish to an SNMP manager.
- The ability of the vendors' own extensions to the standard repertoire of SNMP-manageable objects to load on a generic central-site SNMP management system and its ability to provide additional, worthwhile management information when queried by the manager.

The seven bridges tested were: the 4140 Bridge/Router, from Advanced Computer Communications (ACC) of Santa Barbara, Calif.; the MLS-425 Bridge, from Alantec of Fremont, Calif.; the ProBridge 8033, from Hughes LAN Systems (a subsidiary of Hughes Aircraft Co.) of Mountain View, Calif.; the INX 400/L Local Bridge, from Racal InterLan, Inc. of Boxborough, Mass.; the 4660/S Bridge, from Retix of Santa Monica, Calif.; the IB/2000 Bridge, from 3Com Corp. of Santa Clara, Calif.; and the MAXserver Local Bridge, from Xyplex, Inc. of Boxborough, Mass.

(For a list of the vendors that declined to participate, see "Bridges not included in test," page 53.)

In planning the test series, we decided to use two different SNMP management systems in the test bed. All of the tests involving agent-manager interaction were replicated for each bridge tested. First one manager performed the entire test battery, then the other. Although each manager had a unique Internet Protocol address assigned, only one manager at a time was connected to the LAN. The one not in

(continued on page 34)

Mier, project head of the Network World*/AT&T Bell Laboratories Simple Network Management Lab Test Series, is president of Mier Communications, Inc., a Princeton Junction, N.J.-based communications consultancy that recently launched "SNMP Manager," a newsletter for users, vendors and developers of multivendor SNMP products.*

The two leaders of the test team, Fred Henry, a member of the technical staff at AT&T Bell Labs (standing) and Edwin Mier.

The first in a series of SNMP tests evaluates the performance of various bridges' SNMP agents and the protocol itself.

I'm sitting in a
about my son
above our house
I told him that
hand; however,
some unknown
and my little boy
MAINTENANCE
come up with
actually happen
switch is devoted
for the tip and he
fly right, Dad,
for me going to

© 1990 AT&T

corner office on a round planet and I'm thinking

and how last night he looked at the crescent moon

and said, "Daddy, broken moon, broken moon." And

the moon would be fixed soon by a silent and unseen

the PBX that I bought for the corporation from

company might not be fixed any time soon at all,

who is only five said, "Dad, AT&T has a REMOTE

lab in Denver set up to detect any problems that might

their DEFINITY® System and fix them before they

You see, Dad, a full 1/3 of the memory of a DEFINITY

entirely to self-maintenance." And I told him thanks

looked up at me and said, "Straighten up and

because no silent and unseen hand is going to pay

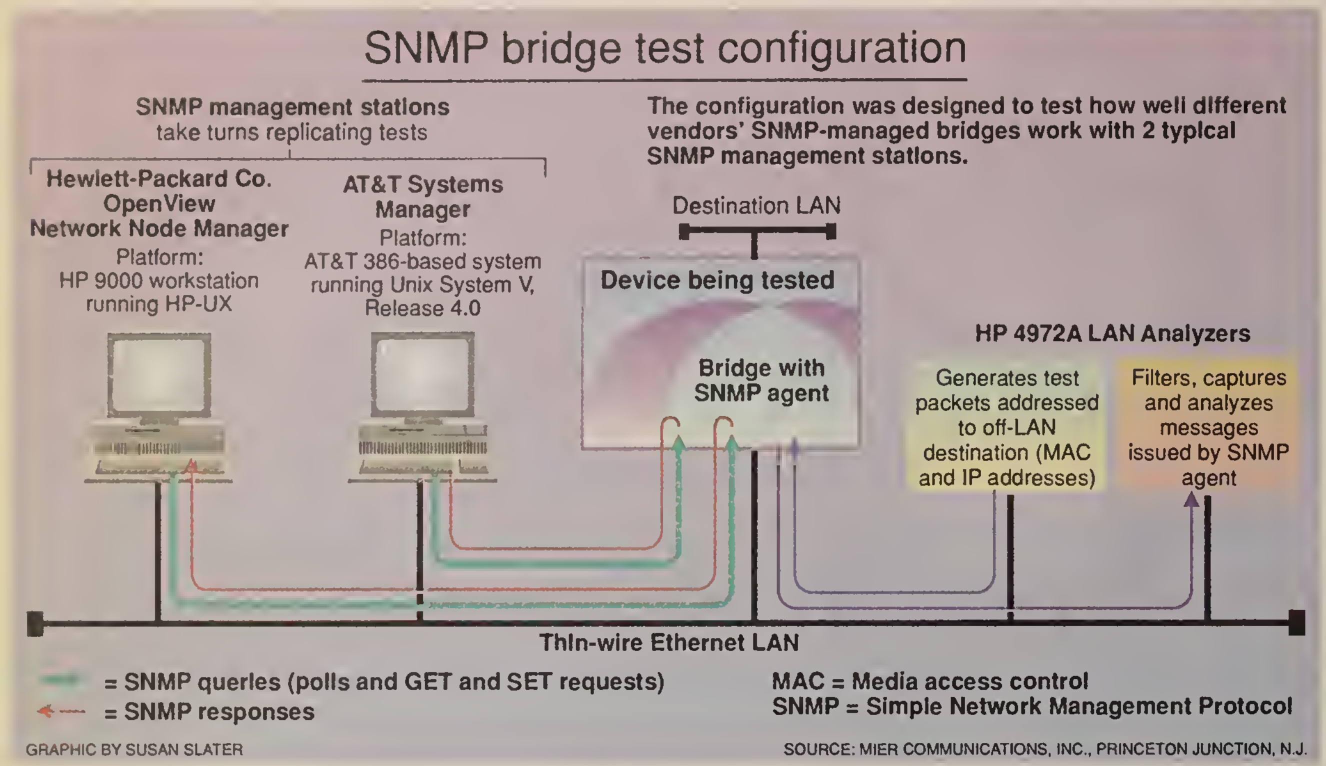
college." AT&T provides several levels of remote maintenance and diagnostic services around the clock. Please call 1 800 247-1212, Ext. 106, for more information or a free copy of THE AT&T CATALOG. In Canada call 1 800 387-6100.

AT&T
The right choice.

(continued from page 31)

use was physically disconnected.

This duplication of managers was to ensure that any anomalies noted in the SNMP agents' responses were indeed coming from the agent and not from a management system's misinterpretation of the response messages.



SNMP bridge test configuration

SNMP management stations
take turns replicating tests
Hewlett-Packard Co. OpenView Network Node Manager
Platform: HP 9000 workstation running HP-UX
AT&T Systems Manager
Platform: AT&T 386-based system running Unix System V, Release 4.0
The configuration was designed to test how well different vendors' SNMP-managed bridges work with 2 typical SNMP management stations.
Destination LAN
Device being tested
Bridge with SNMP agent
HP 4972A LAN Analyzers
Generates test packets addressed to off-LAN destination (MAC and IP addresses)
Filters, captures and analyzes messages issued by SNMP agent
Thin-wire Ethernet LAN
= SNMP queries (polls and GET and SET requests)
= SNMP responses
MAC = Media access control
SNMP = Simple Network Management Protocol

GRAPHIC BY SUSAN SLATER

SOURCE: MIER COMMUNICATIONS, INC., PRINCETON JUNCTION, N.J.

We also insisted that the manager devices selected be generic SNMP managers — systems that can manage a wide variety of different vendors' devices and provide comprehensive support for all of the current SNMP standards and capabilities. Our final requirement was that the management stations come from vendors with solid network management expertise and a reputation for quality products and service.

Among the management stations that we felt met these criteria, our first choices were AT&T's Systems Manager and Hewlett-Packard Co.'s OpenView Network Node Manager 1.1+. Fortunately, both companies accepted our invitation and agreed to lend their equipment and technical support to the project.

AT&T's Systems Manager is produced by Los Angeles-based NetLabs, Inc. under the name Dual Manager. It is a Unix-based software system that can run on different hardware platforms. In our tests, the platform used for this product was an AT&T 80386-based system running Unix System V Release 4.0.

HP's OpenView Network Node Manager is also a software system designed to run in a Unix environment. In our test, Node Manager ran on an HP 9000 workstation on top of HP's adaptation of Unix System V, HP-UX.

How it's supposed to work

With SNMP, every item of management information that an agent device maintains in its memory — whether it be the name and phone number of the person to call about problems with nodes or the number of packets received on a particular LAN interface — is called an object. About 110 such objects constitute the current SNMP Management Information Base, referred to as MIB-I. This is a standard approved by the Internet Engineering Task Force.

Typically, bridges with SNMP capabilities implement about half of these MIB-I objects (some object classes are optional, and some objects are not appropriate for bridges). A substantially enhanced and expanded data base, MIB-II, includes nearly double the number of objects that MIB-I has. MIB-II is currently a draft standard.

Private MIBs

In addition, some vendors have developed their own set of objects, called private or enterprise-specific MIB extensions. These use the same standard underlying SNMP for message formatting and transmission between manager and agent, and are framed in the same syntax as MIB-I and MIB-II — the SNMP standard syntax called Structure of Management Information (SMI).

These private MIBs are supposed to define objects not supported by the standard MIB. In addition, they are supposed to be loadable in any SNMP system designed to import third-party MIBs, provided the MIBs are correctly written in SMI. We discovered, however, that syntactical errors in vendor private MIBs are not uncommon.

What's supposed to happen is this: The vendors' MIB extensions are appended to the standard MIB objects (MIB-I or MIB-II) in the management system, thus creating an MIB superset. Loading these private MIBs — at least in the two management systems we used in this test — is a complex and meticulous process. In roughly half the cases, we were unable to load the private MIBs in one or both management systems.

But even if the private MIB cannot be loaded in the management system, each device's agent is required to at least support the original MIB-I standard objects. We found that most did, though to varying degrees.

Initially, we set out to test eight bridges. However, we were unable to configure and evaluate one of the products: Network Application Technology's LANB/100M. This was because the unit has no RS-232 port for terminal connection, no disk drive and no interface for loading configuration information.

Instead, the vendor uses a little-known server facility, called BOOTP, to download configuration information into the bridge. Despite man-days of effort by Bell Labs' Unix experts, we were unable to bring up the device.

With varying degrees of difficulty, all of the other bridges could be configured for SNMP management and handle queries from both management systems. Configuring for SNMP management requires, at a minimum, inputting the IP address assigned to the agent and the IP address of the management station.

The chart "Variance in bridges' SNMP support" on page 54 highlights some of the key SNMP support differences we noted between the different bridge agents.

Some bridge vendors' documentation is unduly cryptic about how to perform this task. Others' provide fairly comprehensible instructions for configuring their agents for SNMP management.

Kudos go to Hughes LAN Systems, which provides a simple but effective menu-based display on an attached terminal console for configuring the bridge. We were able to set up the Hughes bridge in 20 minutes. Other products, notably the Xyplex and 3Com bridges, took more than two hours to configure.

Reporting LAN addresses

A particularly nettlesome issue for a bridge's SNMP agents is reporting the media access control (MAC)-layer addresses of their LAN ports. These non-user-alterable, 12-byte physical addresses are fixed in the LAN interfaces of each bridge. For obvious diagnostic and network management purposes, it's important for the bridge agent to be able to respond to the management station with the correct physical address of each LAN interface on the bridge.

Of all the bridges tested, only 3Com's SNMP agent was able to correctly report each port's physical Ethernet MAC-layer address. (ACC also correctly reported the address of its single LAN interface. But because ACC offers remote bridges only, two of ACC's remote bridges were tested, connected back-to-back. Each bridge, therefore, had only a single LAN interface to report.)

Most of the bridges reported the MAC address of one of their LAN interfaces and responded with this same address regardless of the interface for which the management station was trying to obtain the physical address.

The management station obtains the MAC address of a particular bridge interface by issuing a GET request to the bridge agent. The object in this particular case is called "ifPhysAddress," which stands for interface physical address in MIB-I syntax. This was one of more than a dozen rudimentary MIB-I objects for which we queried each agent with SNMP GET requests.

All the objects we queried in this part of the testing were from the System and Interface groups of MIB-I, two of the eight object groups that comprise MIB-I. We did not query any of the objects in the three MIB-I object groups that are optional. All the objects we queried in this test phase were particularly appropriate to bridge management.

MIB-II and set

To determine the extent of bridge agents' support of the newer, more extensive MIB-II, we also queried each bridge with a series of GET commands for MIB-II-unique objects, from the System, Interface and SNMP groups. Again, only the 3Com bridge clearly established that it fully supports MIB-II. Racal InterLan's MIB-II support was also reasonably complete.

Some MIB-II support by Hughes' agent was also indicated, but the responses were not as defined in the MIB-II specification and could not be usefully interpreted.

Another forward-looking test we performed was to try to set the values of certain objects in the

(continued on page 53)

Pitfalls to avoid in your SNMP network

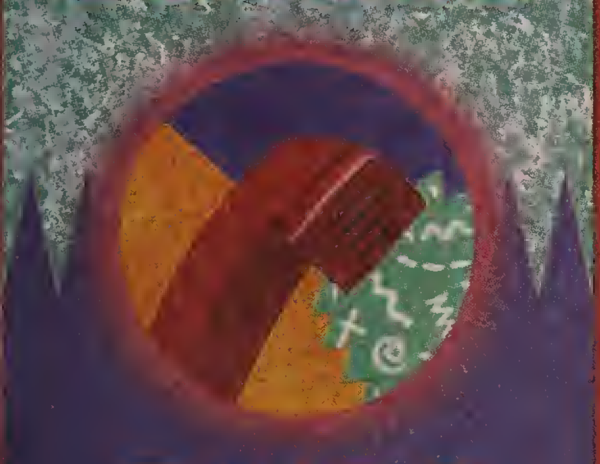
Here are five general guidelines for users that are implementing the Simple Network Management Protocol (SNMP) in their multivendor networks:

- Be sure the Internet Protocol addresses in the device's agent are properly entered and stored. At a minimum, each agent must have its own assigned IP address and the IP address of at least one SNMP manager station readily available in its configuration memory. Don't use a vendor's default IP addresses or subnet masks; they won't be of any use in your network. In addition, some agents require that the device be reset (a warm restart) in order to properly register these crucial IP addresses.
- Don't trust agents' or vendors' documentation when they say they support object SET commands. Try every read/write object for each device agent in order to confirm that the variable really can be set. Do this by first obtaining the object's value, then issuing a SET command to change it. After that, issue a GET command again to confirm that your new value was received. It may even be a good idea to locally reset the unit, then reconfirm with a SET command from the management station that the value was changed.
- Label the ports on each device with their SNMP interface index numbers. First, you'll have to query each device's SNMP agent to establish the SNMP interface number that each port has been assigned. Then, write the SNMP interface number (and the media access control layer, or physical address if it's a local-area network port) on a piece of tape and cover over the vendor's imprinted port number.
- Be sure your manager is issuing SNMP messages to the network before you assume the agent is not listening. It sounds like common sense, but several situations can cause manager stations to go off-line, such as powering up the station when the primary network interface is not active. Techniques such as sending a PING message — a useful Transmission Control Protocol/IP "is anybody there?" feature — to yourself at the management station can confirm what's working and what's not working.
- Keep a log near the management station listing which SNMP features agents support. This information can probably be stored within the management system and displayed along with the device's configuration.

— Edwin Mier

TELECOM

BUYER'S



GUIDE

INTEREXCHANGE CARRIER DIGITAL PRIVATE-LINE SERVICES

Familiarity breeds content

By DANIEL BRIERE

Only six years ago, a frequently seen advertisement showed a network manager in a fever of anxiety at the thought of having to upgrade to T-1 circuits. Familiarity with digital circuits has increased greatly since then.

Currently, voice-grade analog circuits are very much on the wane and the digital private lines that users are implementing to replace them are being sold as commodities.

T-3 service, while still rare, doesn't intimidate managers any more. Many are making some plans to move to T-3 in the next several years. Even Synchronous Optical Network (SONET) — which offers speeds ranging from 50.84M bit/sec to gigabit speeds — is being discussed with aplomb by telecommunications managers at trade shows and conferences.

Behind today's relaxed attitude toward bandwidth is the acceptance of information networking as fundamental to business.

U.S. carriers are quite optimistic that this will lead to continued strong growth in their sales of leased circuits for the foreseeable future. But the new alternatives to private lines, including virtual private networks, may cut into the expected growth.

The greater flexibility of switched, virtual networks makes them an attractive alternative to dedicated private lines.

General industry consensus, confirmed by TeleChoice, Inc. research, indicates that T-1 is the area of most current growth in digital private-line use, and will

(continued on page 36)

Briere is president of TeleChoice, Inc., a Montclair, N.J., telecommunications consultancy specializing in long-distance service analysis and network design. He can be reached at (201) 746-0200.

Here's the lowdown on DDS, fractional T-1, T-1 and T-3 services

NETWORK WORLD

Interexchange carrier digital private-line carriers and options

Carrier	Facility control	Network makeup	Network timing source	ESF capabilities	Nationwide 800 service number	Options	CCR-DACS, DACS offered	M24 multiplexing offered	M13 multiplexing offered	M44 multiplexing offered	CPE provided
Advanced Telecommunications Corp. **Atlanta** **(800) 226-8888**	Owned: 80%; leased: 20% (100% directly controlled)	Fiber: 90%; digital microwave: 10%	BSRF	Full-time monitoring, testing provided	Yes	DDS, fractional T-1, DS1, DS3: route diversity, automatic alternate routing, fiber-only routing	CCR-DACS: DS1, DS3, DDS; DACS: DS1, DS3, DDS	DS1 (POP)	DS1	Not offered	Fractional T-1, DS1, DS3, DDS, subrate DDS
American Private Line Services, Inc. **Needham, Mass.** **(800) 624-9230,** **(617) 455-9000**	Leased: 100%	Fiber: 99%; digital microwave: 1%	BSRF	Full-time monitoring, testing provided, performance reports	Yes	Voice grade, DDS, fractional T-1, DS1: route diversity, automatic alternate routing, fiber-only routing	DACS: fractional T-1	Not offered	Not offered	Not offered	Fractional T-1, DS1
AT&T **Bridgewater, N.J.** **(800) 222-0400**	Owned: 100%	DDS: 100% digital; fractional T-1: 95% fiber; DS1: 100% digital; DS3: 100% fiber	DDS, fractional T-1: BSRF; DS1, DS3: new version of BSRF that uses Defense Department's Global Positioning System	Fractional T-1, DS1 only: full-time monitoring, testing provided, performance reports	Yes	DDS, fractional T-1, DS1: route diversity; DS1 only: automatic alternate routing; DS1, DS3: fiber-only routing	DACS: DDS, fractional T-1, DS1; CCR-DACS: fractional T-1, DS1	Fractional T-1 (POP), DS1 (POP)	DS1	DS1	None
Cable & Wireless Communications, Inc. **Vienna, Va.** **(800) 969-9998**	Owned: 75%; leased: 25%	Fiber: 96%; digital microwave: 4%	BSRF	Full-time monitoring, testing provided, performance reports	Yes	DDS, fractional T-1, DS1, DS3: route diversity, automatic alternate routing, fiber-only routing	CCR-DACS: fractional T-1, DS1; DACS: fractional T-1, DS1	DDS (LEC, POP), fractional T-1 (LEC, POP), DS1 (LEC, POP)	DS1 (LEC, POP), DS3 (LEC, POP)	DS1	DDS, fractional T-1, DS1, DS3
Consolidated Network, Inc. **St. Louis** **(314) 993-9009**	Owned: 70%; leased: 30%	Fiber: 88%; digital microwave: 11%; analog microwave: 1%	BSRF	Full-time monitoring, testing provided	Yes	DDS, DS1, DS3: route diversity, fiber-only routing; automatic alternate routing not offered	DACS: DDS, DS1, DS3	DS1, DS3	DS1, DS3	DS1, DS3	DDS, DS1, DS3
MCI Communications Corp. **Washington, D.C.** **(800) 289-0073**	(1)	Fiber: 75%; digital microwave: 9%; analog microwave: 16%	Loran-C (Stratum 1)	Full-time monitoring, testing provided, performance reports	Yes	DDS, DS1, DS3: route diversity, fiber-only routing; automatic alternate routing not offered	CCR-DACS: DDS, DS1	DDS (LEC), fractional T-1 (LEC-specific), DS1 (LEC, POP)	DS3	Not offered	DDS, fractional T-1, DS1
Metromedia Communications Corp. **Secaucus, N.J.** **(201) 330-5467**	(1)	Fiber: 60%; digital microwave: 40%	BSRF	Full-time monitoring, testing provided, performance reports	Yes	Voice grade, DDS, fractional T-1, DS1; DS3: route diversity, fiber-only routing; DS3: automatic alternate routing	DACS: DDS, DS1, DS3	Voice grade (LEC), DDS (interexchange carrier), fractional T-1, DS1 (LEC, POP, DS3 (LEC, POP)	DS1, DS3	DS1, DS3	Voice grade, DDS, fractional T-1, DS1, DS3
Southern Pacific Telecommunications Company, Inc. **San Francisco** **(415) 541-2000**	Owned: 82%; leased: 18%	Fiber: 95%; digital microwave: 5%	BSRF	Full-time monitoring, testing provided, performance reports (all pending)	Yes	DDS, fractional T-1, DS1, DS3: route diversity, fiber-only routing; automatic alternate routing: not offered	DACS: DDS, fractional T-1, DS1, DS3	Not offered	DDS, fractional T-1, DS1, DS3	DDS, fractional T-1, DS1, DS3	None
US Sprint Communications Co. **Kansas City, Mo.** **(800) 736-1130**	Owned: 100%	Fiber: 100%	Multiple Stratum 1 sources	Full-time monitoring, testing provided, performance reports	Yes	Voice grade, DDS, fractional T-1, DS1: route diversity, fiber-only routing; automatic alternate routing not offered	DACS: DDS, fractional T-1, DS1	DS1 (POP)	Not offered	Not offered	DDS, fractional T-1, DS1
WilTel **Tulsa, Okla.** **(800) 642-2299**	Owned: 97%; leased: 3%	Fiber: 93%; digital microwave: 7%	BSRF	Full-time monitoring, testing provided, performance reports (limited)	Yes	DDS, fractional T-1, DS1, fractional T-3, DS3: route diversity, fiber-only routing; DDS, fractional T-1, DS1, DS3: automatic alternate routing	DACS: DDS, fractional T-1, DS1	DDS, DS1 (LEC)	DDS, fractional T-1, DS1, fractional T-3, DS3	Not offered	DDS, fractional T-1, DS1

BSRF = Basic Synchronous Reference Frequency
CCR = Customer-controlled reconfiguration
CPE = Customer premises equipment
DACS = Digital access and cross-connect system

DDS = Digital data service
ESF = Extended superframe format
LEC = Local exchange carrier
POP = Point of presence

FOOTNOTES:
(1) The company could not provide this information in time for publication.

This chart includes a representative selection of the digital private-line options available from the major interexchange carriers. Some carriers not included offer a full range of competitive products.

SOURCE: TELECHOICE, INC., MONTCLAIR, N.J.

(continued from page 35)

continue to be the leader in the near future.

Fractional T-1 services follow T-1 in popularity. T-3 (DS3 and fractional T-3) services are still too new to be a major factor in the marketplace, but they are coming on strong.

The only major type of digital private-line service showing a decline in use is the traditional digital data service (DDS) line, which is losing ground to T-1 and fractional T-1 services.

Since T-1's introduction, its prices have plummeted, according to TeleChoice research. Generally, from 1987 to 1990, pricing for T-1 lines has fallen by 40% to 70%.

Sadly for users, this trend has not only subsided but seems to be reversing itself somewhat. Carrier T-1 prices leveled off toward the end of 1990 and have in fact crept upward slightly since December.

Under current market conditions, with the plethora of services available and the competition between carriers, it is unlikely that prices will rise in any meaningful way within the next one to three years.

Narrowing gap

Overall price differences between AT&T and competing carriers are narrowing. Typical discounts among carriers range from 20% to 30% below AT&T's tariffed rates.

This is down from 40% to 60% in last year's survey, but it is still enough to provide substantial savings for customers that are willing to shop around.

The usual place to find digital private lines is where they are most needed: in misson-critical data communications situations. Most often, digital private lines are used as high-capacity backbones; often they are based on T-carriers that convey voice and data traffic. Digital private lines are also used as digital data tie lines connecting host CPUs, as links between local-area networks and for videoconferencing.

This last application is one of the most talked-about among both users and carriers. Some reasons for its popularity include the falling prices of video coder/decoders — which can be had for as little as $40,000 — and the improvement of image compression techniques.

The first of the digital circuits, AT&T's Dataphone Digital Ser-

(continued on page 38)

> The only major type of digital private-line service showing a decline in use is the traditional digital data service (DDS) line.
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Interexchange carrier digital private-line services: DDS (56K bit/sec)

Carrier	Product	Access methods	Number of LATAs served directly/ company POPs offering service	Nonrecurring charges (1)	Rate Methods	Access coordination offered (2)	Bypass coordination offered (2)	CO connection charges (2)	Local channel charges	Service performance objectives (3)	DDS secondary channel service offered	DDS multipoint/drop bridging offered	DDS subrate multiplexing
Advanced Telecommunications Corp. Atlanta (800) 226-8888	LaserNet 64	DDSA	All U.S. LATAs/51	Installation: $160 to $300; other: $150 order charge	Mileage-based, CP	Yes, no charge	Yes	No charge	NRC: LEC charges, plus 15%; MRC: LEC charges, plus 15%	EFS: 99.85%; AP: 99.95%	Yes	Yes	Yes, on an individual-case basis
American Private Line Services, Inc. Needham, Mass. (800) 624-9230, (617) 455-9000	Digital Data 9.6K to 56K	DDSA	150/170	Installation: $300; expedite: individual-case basis	Mileage-based	Yes, no charge	Yes	No charge	NRC: LEC charges; MRC: LEC charges	EFS: 99.7%; AP: 99.9%	Not offered	Not offered	Yes, POP: $75 MRC
AT&T Bridgewater, N.J. (800) 222-0400	DATA-PHONE Digital Service	DDSA, SDM	167/185	None	Mileage-based	Yes, NRC: $276; MRC: $28.65	No, but AT&T will coordinate with alternate access carriers upon customer request	NRC: $243; MRC: $51.25	NRC: LEC charges, plus variable markup; MRC: LEC charges, plus 10.1%	EFS: 99.96% end-to-end; AP: 99.975% end-to-end	Yes, LEC rate, plus 10.1%	Yes, POP: SDM 5: $154; SDM 10: $129; SDM 20: $77 (all MRC)	LEC rate, plus 10.1%
Cable & Wireless Communications, Inc. Vienna, Va. (800) 969-9998	FiberPoint DDS	DDSA, DS1	53/106	Installation: $200	Mileage-based	Yes, no charge	Yes	No charge	NRC: LEC charges rounded to nearest $25; MRC: LEC charges	EFS: 99.75% interexchange carrier, 99.5% end-to-end; AP: 99.85% interexchange carrier, 99.7% end-to-end	Not offered	Not offered	LEC: LEC rate
Consolidated Network, Inc. St. Louis (314) 993-9009	DDS	DDSA	30/28	Installation: $350; expedite: $200; other: $100 order charge per circuit	CP	Yes, NRC: LEC charges; MRC: LEC charges	Yes	No charge	NRC: LEC charge, plus 10%; MRC: LEC charge, plus 10%	EFS: 99.95% interexchange carrier; AP: 99.98% interexchange carrier	Yes, LEC rate	Yes, LEC rate	Not offered
MCI Communications Corp. Washington, D.C. (800) 289-0073	Digital Data Service	DDSA, DS1, DS3, alternate access carriers	144/245	Installation: none; expedite: $105; physical changes: $275 per period, $50 per order	Mileage-based	Yes; NRC: $248 (56K bit/sec); $201 (subrate); MRC: $28.65 (all rates)	Yes	NRC: $219 (56K and 64K), $145 (2,400 to 9.6K bit/sec); MRC: $45 (56K and 64K bit/sec), $20 (2,400 to 9.6K bit/sec)	NRC: LEC charge, individual-case basis; MRC: LEC charge, individual-case basis	EFS: 0 to 250 miles: 99.98% interexchange carrier, 99.73% end-to-end; 251 to 1,000 miles: 99.94% interexchange carrier, 99.69% end-to-end; more than 1,000 miles: 99.91% interexchange carrier, 99.66% end-to-end; AP: 0 to 250 miles: 99.95% interexchange carrier, 99.8% end-to-end; 251 to 1,000 miles: 99.9% interexchange carrier, 99.75% end-to-end; more than 1,000 miles: 99.85% interexchange carrier, 99.7% end-to-end	Not offered	Not offered	Not offered
Metromedia Communications Corp. Secaucus, N.J. (201) 330-5467	Digital Data Service	DDSA, DS1, DS3	23/23	Installation: $225 (2,400 to 9.6K bit/sec), $400 (19.2K to 56K bit/sec); expedite: $500	Mileage-based	Yes, LEC monthly charge, plus 5%	Yes	NRC: no charge; MRC: $10	NRC: LEC charges; MRC: LEC charges	EFS: 98.1%; AP: 99.95%	Yes, on an individual-case basis	Yes, on an individual-case basis	Yes, on an individual-case basis
Southern Pacific Telecommunications Company, Inc. San Francisco (415) 541-2000	Digital Data Service	VGSA, VGSW, DDSA, DDSW, fractional T-1, DS1, DS3, alternate access carriers	96/96	Installation: $150; expedite: $75	Mileage-based, CP	Yes, no charge (4)	Yes	No charge	NRC: LEC charges; MRC: LEC charges	EFS: 99.7%; AP: 99.85%	Yes, on an individual-case basis	Yes, on an individual-case basis	Yes, on an individual-case basis
US Sprint Communications Co. Kansas City, Mo. (800) 736-1130	Clearline DDS	DDSA, DS1	187/280 T-1 access POPs, 256 DDS access POPs	None	Mileage-based	Yes, NRC: $276 (56K bit/sec), $223 (2,400 to 9.6K bit/sec); MRC: $28.75	Yes	NRC: $237 (56K bit/sec), $157 (2,400 to 9.6K bit/sec); MRC: $45.40 (56K bit/sec), $16.40 (2,400 to 9.6K bit/sec)	NRC: varies by circuit speed and state; MRC: varies by circuit speed and state	EFS: 99.75% interexchange carrier, 99.5% end-to-end; AP: 99.85% interexchange carrier, 99.7% end-to-end	Not offered	Yes, NRC: $10; MRC: $12	Not offered
WilTel Tulsa, Okla. (800) 642-2299	56K bit/sec DDS	DDSA, DS1, DS3 (with M13 multiplexing)	102/113	Installation: $150; expedite: $50	Mileage-based	Yes, no charge	Yes	No charge	NRC: LEC charges; MRC: LEC charges	EFS: 99.95% interexchange carrier, 99.57% end-to-end; AP: 99.95% interexchange carrier, 99.7% end-to-end (5)	Yes, LEC rate	Yes, LEC rate	Not offered

AP = Availability percentage
CO = Central office
CP = City pair specific
DDS = Digital data service
DDSA = Digital data special access
DDSW = Digital data switched access
EFS = Error-free seconds
LEC = Local exchange carrier
MRC = Monthly recurring charges
NRC = Nonrecurring charges
POP = Point of presence
SDM = Subrate data multiplexing
VGSA = Voice-grade special access
VGSW = Voice-grade switched access

FOOTNOTES:
(1) Charges are per circuit.
(2) Charges are per circuit end.
(3) Service performance figures are for interexchange carrier connections (central office-to-central office) only, unless otherwise noted. Most carriers are willing to guarantee the stated service performance objectives.
(4) No charges apply to access directly connected on a one-to-one basis with Southern Pacific Telecom interexchange carrier channels; when access is concentrated, surcharges may apply on an individual-case basis.
(5) WilTel is in the process of reissuing its service performance figures; the figures in this chart are those used as of March 1.

This chart includes a representative selection of interexchange carriers that offer DDS-level private-line services. Other carriers may offer competing services.

SOURCE: TELECHOICE, INC., MONTCLAIR, N.J.

(continued from page 36)

vice is now being matched by offerings from all the major carriers. Each one offers a 56K or 64K bit/sec DDS. But, as noted, transmissions over DDS are now being replaced by transmissions over T-1 or fractional T-1 in many networks.

> The waning use of DDS implies that users have been willing to sacrifice some of the quality DDS guarantees in return for the lower prices of T-1.
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The waning use of DDS seems to imply that users have been willing to sacrifice some of the quality DDS guarantees in return for the lower prices of data carried over T-1 or fractional T-1. For example, AT&T has been willing to set the end-to-end performance objective of its Dataphone Digital Service at 99.96% error-free seconds and 99.975% availability. (Guarantees are in fact available, and some custom network users have negotiated penalties if performance objectives are not met.)

AT&T's performance objectives for its Accunet T1.5 T-1 service are considerably lower. Taking a 500-mile circuit as an example, the end-to-end objectives are only 99.77% error-free seconds and 99.85% availability. The differences in other carriers' service performance figures between DDS, and fractional and full T-1 circuits are similar.

While such differences may seem small, over an average work year of 2,000 hours (250 days at eight hours per day), that translates to about 2½ hours of difference in downtime, which could be an expensive proposition when considering the strategic importance of most DDS applications. In cases where these applications run 24 hours per day, the downtime difference is almost 10 hours per year.

However, the interexchange carriers are working on improving their performance, and eventually, the differences between DDS performance and T-1 (and other digital services) are likely to diminish. For instance, since the last Buyer's Guide to private lines, AT&T's interoffice error-free seconds rate for T-1 circuits has increased from a range of 99.3% to 99.9%, to this year's figures of 99.9% to 99.96% for the interoffice portion of T-1 channels. It seems likely that, in time, the increasing reliability of T-1 and other recently offered digital private-line services may

(continued on page 39)

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Chart information made simple

Most of the chart entries beginning on page 36 are self-explanatory. However, a few — including the various options listed in Chart 1 — may need some clarification.

■ **Access methods.** Users can obtain access to digital private-line services usually through a range of options, but dedicated digital access lines and DS1 lines are the most frequently used methods. In fact, a DS1 line will get you access to almost every service listed, including digital data service (DDS), fractional T-1 and T-3 services.

■ **Access coordination.** The interexchange carrier will deal with the local exchange carrier on the user's behalf, usually for a fee.

■ **Bypass coordination.** The interexchange carrier will bypass the local exchange carrier's facilities, usually at no charge.

■ **Options.** With automatic alternate routing and route diversity, always ask to see the physical routing of the circuit. The line could easily be leased from another carrier on the same physical route, so you gain nothing if a pole comes down or if the circuit is dug up and cut by a backhoe.

In addition, users that want fiber-only routing should be aware that today, most digital private-line providers are at least 75% fiber.

This is important for users seeking low error rates for their T-1, fractional T-1 and T-3 circuits. (DDS may achieve even higher accuracy without the use of fiber because of its dedicated network and equipment.)

> The user is usually better off buying or leasing whatever equipment is needed, rather than being tied to the service provider.
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■ **Customer-controller reconfiguration (CCR)-Digital access and cross-connect systems (DACS).** CCR functions allow users to electronically reconfigure DS0 channels using customer premises equipment terminals. Basically, this gives users access to their carriers' DACS whenever they want.

■ **DACS.** Generally, DACS functions as the switch and router for T-1 lines. There are clear benefits for using DACS in disaster recovery and alternate routing, but there are still questions as to whether the local exchange carrier or interexchange carrier is better at providing them. Local exchange carrier DACSs are more geared to intra-LATA use. Look at your own network and let its configuration be your guide.

■ **M13 multiplexing.** M13 multiplexers handle point-to-point transmissions; however, they can't separate T-1 lines without first breaking the T-3 into the 28 T-1s that compose the circuit. M13 does not support synchronization of DS1s within a DS3 — in other words, it doesn't support Synchronous Optical Network (SONET). The synchronization inherent in SONET allows users to add individual T-1s to, or drop them from, a T-3 link. Users are probably better off buying their own T-3 multiplexers.

■ **M24 and M44 multiplexing.** These allow users to divide and route 24 or 44 channels, which is not a lot anymore in this bandwidth-intensive world. Users are better off spending their money on their own customer premises equipment, which often affords better capability.

■ **Customer premises equipment provided.** This is dependent entirely upon users' individual needs. In most cases, the service provider will be happy to provide for a fee the necessary customer premises equipment, such as data service unit/channel service units, channel banks or even modems. Equipment fees are charged on an individual-case basis. In the long run, the user is usually better off buying or leasing whatever equipment is needed, rather than being tied to the service provider. An increasingly available option for users, however, is collocation of such equipment in vendor points of presence (POP). Cable & Wireless PLC, for instance, has a formal program for this service, which can save users money and improve reliability.

■ **Network timing source.** Timing is important to keep customer networks and premises equipment synchronized with the attached digital private-line network. Timing discrepancies can cause unwanted line interference, especially jitter, which decreases the reliability of the line. All carriers use variants of Stratum 1 timing, which is any timing source based on the international Cesium clock timing standard. There are several types of Stratum 1 sources.

With two major exceptions — US Sprint Communications Co. and MCI Communications Corp. — the vast majority of carriers use what is known as the Basic Synchronous Reference Frequency (BSRF), colloquially referred to as the Bell System Reference Frequency, for network timing. BSRF is one version of a Stratum 1 timing source. BSRF is popular among the smaller carriers, many of which resell AT&T services; also, to keep equipment costs down, smaller carriers' timing needs to be plug-and-play compatible with that used by AT&T and the regional Bell holding companies. MCI uses Loran-C, which is one type of Stratum 1 timing; US Sprint uses multiple Stratum 1 sources, including Loran-C. Loran-C is the Department of Defense's global positioning system.

■ **Service performance.** As noted in the accompanying charts, service performance figures are for the interexchange lines only, from carrier POP to carrier POP. Some carriers offer end-to-end service performance objectives; these are noted in the charts. Most of the carriers listed are willing to guarantee their stated service performance objectives.

— Daniel Briere

NETWORK WORLD

Interexchange carrier digital private-line services: fractional T-1

Carrier	Product	Access methods	Number of LATAs served directly/ company POPs offering service	Nonrecurring charges (1)	Rate methods	Access coordination offered (2)	Bypass coordination offered (2)	CO connection charges (2)	Local channel charges	Service performance objectives (3)
Advanced Telecommunications Corp. **Atlanta** **(800) 226-8888**	LaserNet 64	VGSA, DDSA	All U.S. LATAs/51	Installation: $160 to $300; other: $150 order charge	Mileage-based, CP	Yes, no charge	Yes	No charge	NRC: LEC charges; MRC: LEC charges	EFS: 99.85%; AP: 99.95%
American Private Line Services, Inc. **Needham, Mass.** **(800) 624-9230, (617) 455-9000**	Fractional T-1	DS1	150/170	Installation: $400; expedite: Individual-case basis	Mileage-based	Yes, no charge	Yes	No charge	NRC: LEC charges, plus 10.1%; MRC: LEC charges, plus 10.1%	EFS: 99.7%; AP: 99.9%
AT&T **Bridgewater, N.J.** **(800) 222-0400**	Accunet Spectrum of Digital Services	VGSA, DDSA, AFDAS, fractional T-1, DS1, DS3	196/571	Installation: $200 to $500, depending on line speed	Mileage-based	Yes, NRC: $201 (9.6K, 56K and 64K bit/sec), $513 (128K to 768K bit/sec); MRC: $20.50 (9.6K, 56K and 64K bit/sec), $30.75 (128K bit/sec), $36 (256K bit/sec), $41 (384K bit/sec), $46.25 (512K bit/sec), $51.25 (768K bit/sec)	Not offered	NRC: $201 (9.6K, 56K and 64K bit/sec), $513 (128K to 768K bit/sec); MRC: no charge	NRC: LEC charges, plus a variable markup; MRC: LEC charges, plus 10.1%	EFS: 0 to 250 miles: 99.99% interexchange carrier, 99.89% end-to-end; 251 to 1,000 miles: 99.99% interexchange carrier, 99.88% end-to-end; more than 1,000 miles: 99.96% interexchange carrier, 99.88% end-to-end; AP: 0 to 250 miles: 99.9% interexchange carrier, 99.85% end-to-end; 251 to 1,000 miles: 99.88% interexchange carrier, 99.83% end-to-end; more than 1,000 miles: 99.85% interexchange carrier, 99.80% end-to-end
Cable & Wireless Communications, Inc. **Vienna, Va.** **(800) 969-9998**	Intelli-Flex	DS1	53/106	Installation: $200; other: $500 per network access port	Mileage-based, plus $150 network port MRC	Yes, NRC: $200	Yes	No charge	NRC: LEC charges, plus 10%; MRC: LEC charges, plus 10%	EFS: 99.0% interexchange carrier; 96.5% end-to-end; AP: 99.9% interexchange carrier, 99.75% end-to-end
MCI Communications Corp. **Washington, D.C.** **(800) 289-0073**	Digital Private Line Service (DS0/fractional T-1)	VGSA, VGSW, DDSA, DS1, DS3, alternate access carriers	156/268	NRC: $105; physical changes: $275 per line; $50 per order	Mileage-based	Yes, NRC: $150 (VGSA, VGSW), $201 (2,400 to 9.6K bit/sec), $248 (56K bit/sec)	Yes	NRC: $176; MRC: no charge	NRC: LEC charges; MRC: LEC charges (4)	EFS: 0 to 250 miles: 99.96% interexchange carrier, 99.71% end-to-end; 251 to 1,000 miles: 99.91% interexchange carrier, 99.66% end-to-end; more than 1,000 miles: 99.86% interexchange carrier, 99.61% end-to-end; AP: 0 to 250 miles: 99.9% interexchange carrier, 99.75% end-to-end; 251 to 1,000 miles: 99.85% interexchange carrier, 99.7% end-to-end; more than 1,000 miles: 99.8% interexchange carrier, 99.65% end-to-end
Metromedia Communications Corp. **Secaucus, N.J.** **(201) 330-5487**	Fractional DS1 Service	DS1	20/20	None	Mileage-based	Yes, no charge	Yes	No charge	NRC: LEC charges; MRC: LEC charges	EFS: 0 to 250 miles: 99.96%; 251 to 1,000 miles: 99.91%; more than 1,000 miles: 99.86%; AP: 0 to 250 miles: 99.96%; 251 to 1,000 miles: 99.93%; more than 1,000 miles: 99.9%
Southern Pacific Telecommunications Company, Inc. **San Francisco** **(415) 541-2992**	Fractional T-1 Service	VGSA, VGSW, DDSA, DDSW, fractional T-1, DS1, alternate access carriers	96/96	Installation:$500	Mileage-based	Yes, no charge (5)	Yes	No charge	NRC: LEC charges, MRC: LEC charges	EFS: 99.7%, AP: 99.85%
US Sprint Communications Co. **Kansas City, Mo.** **(800) 736-1130**	Clearline Fractional 1.5	DS1	187/280	None	Mileage-based	Yes, NRC: $186 (for T-1 access); MRC: $22 (for T-1 access)	Yes	NRC: $279 (for T-1 access); MRC: $62 (for T-1 access)	NRC: $1,165; MRC: varies by NPA-NXX	EFS: 99.0% interexchange carrier, 96.5% end-to-end; AP: 99.85% interexchange carrier, 99.7% end-to-end
WilTel **Tulsa, Okla.** **(800) 642-2299**	Fractional T-1 Service	Fractional T-1, DS1, DS3 (with M13 multiplexing)	65/65	Installation: $150; expedite: $50	Mileage-based	Yes, no charge	Yes	No charge	NRC: LEC charges; MRC: LEC charges	EFS: 99.95% interexchange carrier, 97.99% end-to-end; AP: 99.9% interexchange carrier, 99.35% end-to-end (6)

AFDAS = Accunet Flexible Digital Access Service
AP = Availability percentage
CO = Central office
CP = City pair specific
DDSA = Digital data special access
DDSW = Digital data switched access
EFS = Error-free seconds
LEC = Local exchange carrier
MRC = Monthly recurring charges
NRC = Nonrecurring charges
POP = Point of presence
VGSA = Voice-grade special access
VGSW = Voice-grade switched access

FOOTNOTE:

(1) Charges are per circuit.
(2) Charges are per circuit end.
(3) Service performance figures are for interexchange carrier connections (central office-to-central office) only, unless otherwise noted. Most carriers are willing to guarantee the stated service performance objectives.
(4) Nonrecurring and monthly recurring charges for each local access channel will be calculated on an individual-case basis in accordance with the charges set forth in the relevant LEC tariff.
(5) No charges apply to access directly connected on a one-to-one basis with Southern Pacific Telecom interexchange carrier channels; when access is concentrated, surcharges may apply on an individual-case basis.
(6) WilTel is in the process of reissuing its service performance figures; the figures in this chart are those used as of March 1.

This chart includes a representative selection of interexchange carriers that offer fractional T-1 private-line services. Other carriers may offer competing services.

SOURCE: TELECHOICE, INC., MONTCLAIR, N J.

(continued from page 38)

force DDS into retirement.

One might think that with the coming of switched digital services such as Switched 56, Switched 64 and AT&T's new 384K bit/sec and 1.5M bit/sec switched offerings that digital private-line services would be threatened.

There has been some product substitution, particularly at the 56K and 64K bit/sec data rates. Based upon requests from their users, most carriers see trends toward expansion of switched digital services. Videoconferencing is a major user application that is best suited to switched digital services.

Reserved bandwidth

A few carriers, including AT&T, US Sprint Communications Co. and WilTel, also offer some sort of reserved digital private-line service that will compete against full-time private-line offerings. The majority of carriers are expected to offer such services by the end of 1992.

There are different methods of providing reserved private-line services, but the overall plan is the same. Users set up an account with the carrier. When bandwidth needs increase temporarily, the user calls the carrier and requests additional bandwidth for a certain length of time. Depending on the carrier, this bandwidth can be provided as little as 15 minutes after the user calls in requesting it.

Bandwidth is usually available in 64K bit/sec increments, from 128K bit/sec to T-1. The carrier generally requires the user to have dedicated DS1 access lines in order to take advantage of such services.

Applications for services include videoconferencing, point-to-point high-speed data transmission, cyclical or seasonal transaction processing transmission needs, the installation of a temporary network node, overflow voice trunking or alternate routing for disaster recovery.

The end of private lines?

Does the development of such dynamic services spell the end of dedicated digital private lines? Certainly not. But the expansion of data transmission needs is continuing at such a fast rate that there is more than enough traffic for all of these services.

In the future, the typical large user organization will have a hybrid switched/dedicated network, with dedicated T-carrier trunks as its backbone, carrying most of the regular heavy data transmission. Virtual nets, including switched data services and bandwidth-on-demand ser-

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Interexchange carrier digital private-line services: T-1

Carrier	Product	Access methods	Number of LATAs served directly/ company POPs offering service	Nonrecurring charges (1)	Rate methods	Access coordination offered (2)	Bypass coordination offered (2)	CO connection charges (2)	Local channel charges	Service performance objectives (3)
Advanced Telecommunications Corp. **Atlanta** **(800) 226-8888**	LaserNet 1.544	DS1	All U.S. LATAs/51	Installation: $900; other: $150 order charge	Mileage-based, CP	Yes, no charge	Yes	No charge	NRC: LEC charges; MRC: LEC charges	ESF: 99.85%; AP: 99.95%
American Private Line Services, Inc. **Needham, Mass.** **(800) 624-9230, (617) 455-9000**	T-1 Service	DS1	150/170	Installation: $500; expedite: individual-case basis	Mileage-based	Yes, no charge	Yes	No charge	NRC: LEC charges; MRC: LEC charges	EFS: 99.7%; AP: 99.9%
AT&T **Bridgewater, N.J.** **(800) 222-0400**	Accunet T1.5 Service	VGSA, VGSW, DDSA, DDSW, DS1, DS3, customer-provided access	196/460	None	Mileage-based	Yes, NRC: $207; MRC: $21.75	Yes	NRC: $310; MRC: $103	NRC: LEC charges, plus $4 billing charge; MRC: LEC charges, plus $4 billing charge	EFS: 0 to 250 miles: 99.96% interexchange carrier, 99.8% end-to-end; 251 to 1,000 miles: 99.93% interexchange carrier, 99.77% end-to-end; more than 1,000 miles: 99.9% interexchange carrier, 99.75% end-to-end; AP: 0 to 250 miles: 99.97% interexchange carrier, 99.87% end-to-end; 251 to 1,000 miles: 99.95% interexchange carrier, 99.85% end-to-end; more than 1,000 miles: 99.93% interexchange carrier, 99.83% end-to-end
Cable & Wireless Communications, Inc. **Vienna, Va.** **(800) 969-9998**	DS1 Service	VGSA, VGSW, DDSA, DS1, DS3	53/106	Installation: $1,000	Mileage-based	Yes, NRC: $200; MRC: no charge	Yes	No charge	NRC: LEC charges, plus 10%; MRC: LEC charges, plus 10%	EFS: 99.0% interexchange carrier; 96.5% end-to-end; AP: 99.9% interexchange carrier; 99.75% end-to-end
Consolidated Network, Inc. **St. Louis** **(314) 993-9009**	DS1 Service	VGSA, DDSA, DS1	30/28	Installation: $500; other: $100 order charge	CP	Yes, NRC: LEC charges; MRC: LEC charges	Yes	No charge	NRC: LEC charges, plus 10%; MRC: LEC charges, plus 10%	EFS: 99.95% interexchange carrier; AP: 99.98% interexchange carrier
MCI Communications Corp. **Washington, D.C.** **(800) 289-0073**	Terrestrial Digital Service - 1.5	DS1, DS3, alternate access carriers	156/268	Expedite: $105; physical changes: $1,000 per line; $50 per order	Mileage-based	Yes, NRC: $186 MRC: $21.70	Yes	NRC: $279; MRC: 100	NRC: LEC charges; MRC: LEC charges (4)	EFS: 0 to 250 miles: 99.96% interexchange carrier, 97.48 end-to-end; 251 to 1,000 miles: 99.91% interexchange carrier, 97.43% end-to-end; more than 1,000 miles: 99.86% interexchange carrier, 97.38% end-to-end; AP: 0 to 250 miles: 99.96% interexchange carrier, 99.81% end-to-end; 251 to 1,000 miles: 99.93% interexchange carrier, 99.78% end-to-end; more than 1,000 miles: 99.9% interexchange carrier, 99.75% end-to-end
Metromedia Communications Corp. **Secaucus, N.J.** **(201) 330-5467**	DS1 Service	VGSA, DS1, DS3	52/52	Installation: $500	Mileage-based	Yes, NRC: no charge; MRC: LEC rate, plus 2%	Yes	MRC: $45	NRC: LEC charges; MRC: LEC charges	EFS: 98.1%; AP: 99.95%
Southern Pacific Telecommunications Company, Inc. **San Francisco** **(415) 541-2993**	DS1 Service	VGSA, VGSW, DDSA, DDSW, fractional T-1, DS1, alternate access carriers	96/96	Installation: $750	Mileage-based	Yes, no charge (5)	Yes	No charge	NRC: LEC charges; MRC: LEC charges	EFS: 99.7%; AP: 99.85%
US Sprint Communications Co. **Kansas City, Mo.** **(800) 736-1130**	Clearline 1.5	VGSA, DDSA, DS1	187/280	None	Mileage-based; volume pricing plan available	Yes, NRC: $186 (for T-1 access); MRC: $22 (for T-1 access)	Yes	NRC: $279 (for T-1 access); MRC: $62 (for T-1 access)	NRC: $1,165; MRC: varies by NPA-NXX	EFS: 99.0% interexchange carrier, 96.5% end-to-end; AP: 99.85% interexchange carrier, 99.7% end-to-end
WilTel **Tulsa, Okla.** **(800) 642-2299**	DS-1 Service	DS1, DS3 (with M13 multiplexing)	228/250	Installation: $400; expedite: $100	Mileage-based	Yes, no charge	Yes	No charge	NRC: LEC charges; MRC: LEC charges	EFS: 99.95% interexchange carrier, 97.33% end-to-end; AP: 99.96% interexchange carrier, 99.65% end-to-end (6)

AP = Availability percentage
CO = Central office
CP = City pair specific
DDSA = Digital data special access
DDSW = Digital data switched access
EFS = Error-free seconds

LEC = Local exchange carrier
MRC = Monthly recurring charge
NRC = Nonrecurring charge
POP = Point of presence
VGSA = Voice-grade special access
VGSW = Voice-grade switched access

FOOTNOTES:

(1) Charges are per circuit.

(2) Charges are per circuit end.

(3) Service performance figures are for interexchange carrier connections (central office-to-central office) only, unless otherwise noted. Most carriers are willing to guarantee the stated service performance objectives.

(4) Nonrecurring and monthly recurring charges for each local access channel will be calculated on an individual-case basis in accordance with the charges set forth in the relevant LEC tariff.

(5) No charges apply to access directly connected on a one-to-one basis with Southern Pacific Telecom interexchange carrier channels; when access is concentrated, surcharges may apply on an individual-case basis.

(6) WilTel is in the process of reissuing its service performance figures; the figures in this chart are those used as of March 1.

This chart includes a representative selection of interexchange carriers that offer T-1 private-line services. Other carriers may offer competing services.

SOURCE: TELECHOICE, INC., MONTCLAIR, N.J

(continued from page 39)

vices, will serve the temporary or peak data needs and most of the intracompany voice needs.

From the time T-1 service became widely available in the mid-1980s, the move among users has been to integrate voice and data networks to take advantage of — and to justify the cost of — the seemingly huge bandwidth offered by T-1 circuits.

A combination of factors could reverse this integration trend. The major factors are the increased availability and falling prices of digital private-line services and the explosion of data being transmitted.

Voice/data disintegration

Because the ever-expanding volume of data being sent and received by users requires ever-increasing use of bandwidth, networks that formerly needed to combine voice and data traffic are now choked with data alone. Simply buying more capacity won't solve the problem.

Users need to figure out where bandwidth is needed, how best to configure the network to adapt to the changing bandwidth needs and how to manage the bandwidth. Therefore, many net managers are moving voice traffic off-net and back into either the public switched telephone network or, more frequently for large users, to virtual private networks.

The upshot is what some analysts have called the disintegration of networks — namely, the reverse of the earlier cycle of integration of voice and data into one network. Users are either contemplating or actually beginning to move their voice and data back onto separate networks. These users plan, however, to manage their nets with a single integrated management system.

The development and rollout of fractional T-1 service may also be a factor. The price of fractional T-1 service, especially compared with T-1 service, allows users to cost-justify small, stand-alone data networks. In fact, most users don't need full T-1 service between most of their network nodes, which brought fractional T-1 to market in the first place. And as their data transmissions increase, users can easily add fractional T-1 channels to their existing networks.

The main problem with fractional T-1 service is that, so far, the majority of the regional Bell holding companies still require the use of a full T-1 line for access to the local central office. They are waiting to see if user interest in access through fractional T-1 circuits increases enough for them to justify offering services.

T-3 tea party

T-3 is not coming; it's here. Six of the nine carriers covered in this Buyer's Guide currently offer

(continued on page 42)

NETWORK WORLD

Interexchange carrier digital private-line services: T-3

Carrier	Product	Access methods	Number of LATAs served directly/ company POPS offering service	Nonrecurring charges (1)	Rate methods	Access coordination offered (2)	Bypass coordination offered (2)	CO connection charges (2)	Local channel charges	Service performance objectives (3)
Advanced Telecommunications, Inc. **Atlanta** **(800) 226-8888**	LaserNet 45	DS3, buildouts	All U.S. LATAs/51	Installation: $450 per circuit end; other: $150 order charge	Mileage-based, individual-case basis, CP	Yes, no charge	Yes	No charge	NRC: LEC charges; MRC: LEC charges	ESF: 99.85%; AP: 99.95%
AT&T **Bridgewater, N.J.** **(800) 222-0400**	Accunet T45 Service	DS1 (with M28 multiplexing), DS3	143/273	Installation: individual-case basis	Mileage-based	Yes, NRC: $2,300; MRC: $130	No, but AT&T will coordinate with alternate access carriers upon customer request	NRC: $527; MRC: $462	NRC: LEC charges; MRC: LEC charges	EFS: 0 to 250 miles: 99.92% interexchange carrier, 99.90% end-to-end; 251 to 1,000 miles: 99.86% interexchange carrier, 98.94% end-to-end; more than 1,000 miles: 99.79% interexchange carrier, 98.87% end-to-end; AP: 0 to 250 miles: 99.97% interexchange carrier, 99.87% end-to-end; 251 to 1,000 miles: 99.95% interexchange carrier, 99.85% end-to-end; more than 1,000 miles: 99.93% interexchange carrier, 99.83% end-to-end
Cable & Wireless Communications, Inc. **Vienna, Va.** **(800) 969-9998**	DS3 Service	DS1, DS3	53/106	Installation: $2,000	Mileage-based	Yes, no charge	Yes	No charge	NRC: LEC charges; MRC: LEC charges	EFS: 99.9% interexchange carrier; AP: 99.9% interexchange carrier
Consolidated Network, Inc. **St. Louis** **(314) 993-9009**	DS3 Service	VGSA, DDSA, DS1, DS3	30/28	Installation: $500; expedite: $300; other: $100 order charge	CP	Yes, NRC: LEC charges; MRC: LEC charges	Yes	No charge	NRC: LEC charges, plus a percentage figured on an individual-case basis; MRC: LEC charges, plus a percentage figured on an individual-case basis	EFS: 99.95% interexchange carrier; AP: 99.98% interexchange carrier
MCI Communications Corp. **Washington, D.C.** **(800) 289-0073**	Terrestrial Digital Service-45	DS3, alternate access carriers	80/120	None	Mileage-based	Yes, NRC: $2,200; MRC: $125	Yes	NRC: $500; MRC: $450	NRC: LEC charges; MRC: LEC charges (4)	EFS: 0 to 250 miles: 99.9% interexchange carrier, 97.42% end-to-end; 251 to 1,000 miles: 99.78% interexchange carrier, 97.30% end-to-end; more than 1,000 miles: 99.65% interexchange carrier, 97.17% end-to-end; AP: 0 to 250 miles: 99.96% interexchange carrier, 99.81% end-to-end; 251 to 1,000 miles: 99.94% interexchange carrier, 99.79% end-to-end; more than 1,000 miles: 99.92% interexchange carrier, 99.77% end-to-end
Metromedia Communications Corp. **Secaucus, N.J.** **(201) 330-5467**	DS3 Service	VGSA, DS1, DS3	52/52	Installation: individual-case basis	Mileage-based	Yes, NRC: individual-case basis; MRC: individual-case basis	Yes	NRC: individual-case basis; MRC: individual-case basis	NRC: LEC charges; MRC: LEC charges	EFS: 98.1%; AP: 99.95%
Southern Pacific Telecommunications Company, Inc. **San Francisco** **(415) 541-2993**	DS3 Service	VGSA, VGSW, DDSA, DDSW, fractional T-1, DS1, alternate access carriers	96/96	Installation: $2,000, expedite: individual-case basis	Mileage-based	Yes, no charge (5)	Yes	No charge	NRC: LEC charges; MRC: LEC charges	EFS 99.7%; AP: 99.85%
WilTel **Tulsa, Okla.** **(800) 642-2299**	DS3 Service	DS3	65/65	Installation: $2,000; expedite: $500	Mileage-based	Yes, no charge	Yes	No charge	NRC: LEC charges; MRC: LEC charges	EFS: 99.95% interexchange carrier, 89.83 end-to-end; AP: 99.98% interexchange carrier, 99.75% end-to-end (6)

AP = Availability percentage
CO = Central office
CP = City pair specific
DDSA = Digital data special access
DDSW = Digital data switched access
EFS = Error-free seconds

LEC = Local exchange carrier
MRC = Monthly recurring charge
NRC = Nonrecurring charge
POP = Point of presence
VGSA = Voice-grade special access
VGSW = Voice-grade switched access

FOOTNOTE:

(1) Charges are per circuit.
(2) Charges are per circuit end.
(3) Service performance figures are for interexchange carrier connections (central office-to-central office) only, unless otherwise noted. Most carriers are willing to guarantee the stated service performance objectives.
(4) Nonrecurring and monthly recurring charges for each local access channel will be calculated on an individual-case basis in accordance with the charges set forth in the relevant LEC tariff.
(5) No charges apply to access directly connected on a one-to-one basis with Southern Pacific Telecom interexchange carrier channels; when access is concentrated, surcharges may apply on an individual-case basis.
(6) WilTel is in the process of reissuing its service performance figures; the figures in this chart are those used as of March 1.

This chart includes a representative selection of interexchange carriers that offer T-3 private-line services. Other carriers may offer competing services.

SOURCE: TELECHOICE, INC., MONTCLAIR, N.J.

(continued from page 41)

T-3 services, and the others plan to. Oddly enough, the only major carrier not offering T-3 service on a regular basis is the carrier with the highest percentage of fiber-optic cabling: US Sprint. But US Sprint offers T-3 on an individual-case basis and plans to offer T-3 service across its entire network. The carrier is currently putting all of the necessary facilities in place to offer T-3 nationwide, but the rollout date has not been released.

Although most carriers offer it, T-3 service is still limited in terms of geographic availability. Therefore, potential users should be cautious about planning networks based on T-3 until they are sure that the points they wish to serve are covered.

The competition that has pushed fractional T-1 and T-1 prices down hasn't really taken hold in the T-3 arena yet. And as T-1 prices drop, the number of T-1 lines needed to justify T-3 has grown.

In most areas, T-3 is still too new for its pricing to be greatly affected by demand. In addition, T-3 prices are still a bit too high for most users to justify. And the bandwidth of T-3 — 28 T-1s — is still too much for many midsize and large companies.

Most T-3 users are giant organizations that foresee the need for large bandwidth in the near future and have implemented T-3 in preparation for that need. Some of these users actually sublet extra capacity on their T-3 pipes to other users.

But if history is any indication in predicting data use — and it usually is — the number of users needing T-3 service will grow at about the same rate as the number of users needing T-1.

The growth of T-3 service should also mean the availability of fractional T-3 service. To date, only one of the carriers surveyed for this Buyer's Guide — WilTel — offers a fractional T-3 service. WilTel's fractional T-3 is available in increments of four to 28 DS1 channels. As usual, other carriers such as AT&T are considering entry into the market.

The prospective uses for fractional T-3 include videoconferencing, LAN interconnection, integrated voice/data private networking and other high-volume, bandwidth-intensive appli-

> The competition that has pushed fractional T-1 and T-1 prices down hasn't really taken hold in the T-3 arena yet.

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cations. The advantages of fractional T-3 are the same as those of fractional T-1: Users pay for only the bandwidth they need to use. At this time, however, it is unclear if there will be a major niche for fractional T-3 to fill. Most users rarely need to increase their bandwidth by more than one or two T-1 circuits at a time.

It now seems more likely that users will receive SMDS before they see SONET.

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Additionally, many applications that currently require large amounts of bandwidth are using sophisticated compression and other technologies to lessen the required bandwidth.

Some see T-3 as a stepping-stone on the path to the circuit-switched SONET and the high-speed packet service Switched Multimegabit Data Service (SMDS). For example, T-3 requires use of fiber-optic or other high-capacity cabling. As buildings are wired for T-3, they also become SMDS- and SONET-ready.

Moreover, SONET is an international standard; T-3 is mostly used only in North America. The expanding transmission needs of multinational corporations will likely hasten the introduction of SONET and SMDS into North American networks.

It now seems more likely that users will receive SMDS before they see SONET. MCI Communications Corp. plans to file an SMDS tariff by the end of 1991, and we will likely see most, if not all, of the RBHCs filing SMDS tariffs by mid-1992.

ESF capabilities

One of the hottest issues of private-line networking last year was the development and implementation by the interexchange carriers of extended superframe format (ESF). ESF, with extended space in each data frame for management information, gives the carrier exceptional capabilities in network management and reporting.

ESF affords greater capability to users as well. Both WilTel and US Sprint have announced proactive network performance monitoring and reporting capabilities based on ESF usage. In these services, the carrier equipment senses faults or potential faults, gets the performance information and usually initiates corrective action before the user knows there is a problem.

Pricing is one of the thorniest issues involving private lines, digital or otherwise.

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WilTel and other carriers are working on systems that allow users to access the carriers' switches, which allows them to access the latest network configuration and management information.

The management capabilities of ESF also make it a key to the growing number of bandwidth-on-demand services offered by digital private-line carriers. The increased network management information — routing and other network configuration information — gives the carriers the flexibility needed to provide such services.

Carriers are currently utilizing ESF more than users, mainly because it is so new to users. But that is changing rapidly now that carrier ESF-based networks are in place, ESF-based services are available and ESF-capable networking equipment is making its way into the market.

Buying bandwidth

In buying bandwidth, as in all networking purchases, careful shopping is advisable. Nowadays, T-1 and all digital circuits can be obtained in virtually all regions from vying vendors and their prices may not be tariffed. In fact, the listed price may only be a starting point for negotiations. Although the cost of most digital private lines has leveled off recently, this doesn't mean that all carriers offer the same prices.

These days, the choice is between digital private-line services and switched digital services. So if your bandwidth need is for connectivity on a periodic or sporadic basis, look into the bandwidth-on-demand offerings from carriers. In general, carriers quote a break-even point of three to four hours of daily switched digital usage to cut over to a full-time private-line circuit. That figure varies with mileage and capacity, however.

Remember that the price of these bandwidth-on-demand services are usually at a premium compared to leased circuits. These services are priced as virtual private lines with mileage-based hourly rates. Some carriers cap their hourly rates at a flat monthly fee just higher than the cost of a private line between the points.

Many users have full-time circuits to cover their regular needs and supplemental switched digital service for peak and alternate service.

Pricing

Pricing is one of the thorniest issues involving private lines, digital or otherwise. Every carrier has different methods of pricing every aspect of its private lines. Some charge installation and ordering fees; others may waive such fees but have higher monthly access or central office connection charges, or even monthly usage rates.

A comprehensive explanation and comparison of monthly usage rates would fill a book. Every carrier offers standard rates, usually discounted from AT&T's tariffed rate for the same type of service. These discounts range from about 20% to about 30% lower than AT&T's.

However, every carrier — including AT&T — offers a separate, usually large, range of volume discounts off of their listed rates. Some offer discounts as great as 60% off their list prices. And all of them are willing to negotiate these rates, depending on customer size, length of commitment and whether they or other carriers are offering special promotions.

When negotiating, make sure that the prices you've been shown are good for the length of the lease and not for the initial installation.

Find out if you need to get necessary customer premises equipment from the carrier — at added cost — or if you can provide your own. You're almost always better off providing your own, both in terms of equipment cost and present and future network flexibility.

Finally, examine your needs and decide whether you really need dedicated digital private lines at all. More alternatives exist than ever before, even within the range of digital private lines themselves. Don't just call your carrier representative and say, "I need a digital private line." The carrier is apt to sell you whatever you ask for. But if you present the carrier with an application, it will help you search for the best solution.

When shopping for digital private lines, tell the carrier, "I've got this networking requirement. What can you do for me?" It may be that a range of possibilities is open to you, whether it's one of a number of standard digital private-line services, a reserved private line, a switched digital service or a combination of any of these.

Most corporate telecommunications managers don't plan for longer than three years into the future, mostly because of the changing nature of the technology and its prices. Many plan for this year, hope for next year and cross their fingers for the third year.

If you're in this position, look into alternatives; don't lock yourself into a dedicated network if you don't need it. ◻

Looking for bargains

When shopping for digital private lines — or any service, for that matter — keep your eyes open for special promotions. They can offer great benefits, such as the waiving of installation and monthly recurring charges for a period of time. But they also usually require the customer to commit to using the carrier for at least one year.

Here are some examples of recent promotions:

- AT&T just completed two. On March 15, the company ended its Accunet Spectrum of Digital Services (ASDS) promotion. It waived all monthly interoffice channel charges and related charges for three months on new ASDS circuits. The result to customers was virtually free installation of new ASDS circuits.

  And on March 31, AT&T closed the doors on its Accunet T1.5 promotion, which waived the nonrecurring charges on interstate Accunet T1.5 interoffice channels. The charges waived included T1.5 local channel installation, access coordination and access connection.
- MCI Communications Corp.'s latest promotion, which ended March 15, gave customers free T-1 local-loop access for all MCI services that could be accessed via T-1 lines.
- US Sprint Communications Co. is in the middle of a major promotion. As of April 1, US Sprint has been waiving the nonrecurring installation charges for T-1 access for all new or current customers that order Clearline circuits. In addition, US Sprint will waive the nonrecurring charges for central office connection and access coordination for all new or existing Clearline 1.5 customers.

  For Clearline 1.5, International Clearline 1.5, Clearline Fractional T-1 and Clearline Voiceband, the waiver will apply to the T-1 access installation charge for both ends of the Clearline circuits, to the charge for both ends of the central office connection and to the access coordination charge.

  To qualify, orders must be accepted by US Sprint on or before May 31, when the promotion ends. Installation must be completed by Aug. 31.

— Daniel Briere

Letters

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solutions: fractional T-1, T-1, T-3, Integrated Services Digital Networks, frame relay, broadband ISDN, Synchronous Optical Network, Fiber Distributed Data Interface, Simple Network Management Protocol, Transmission Control Protocol/Internet Protocol and Open Systems Interconnection, as well as my own favorite, All Things To All People, or ATTAP.

Not enough work has been done in defining business applications such as image transfer, teleconferencing, telecommuting and a truly friendly man-machine interface.

Many solutions have been designed by many vendors, but none have really caught on. The result is that technology is looking for markets, which in turn frustrates users and vendors.

The most important problem facing our industry — and for that matter, our country — is how to make workers more productive. They need the synergy of exchanging ideas with others or, to put it another way, networking. That is why our industry is so vital to the nation. The networking of ideas just might be our country's most important resource. Unfortunately, we as a nation are not managing this resource properly.

Within the industry, we need more partnering among the stakeholders — carriers, vendors, end users, regulators, consultants and the press. The only way to do that is to talk less about solutions and more about opportunities.

One organization that promotes true partnering among all the industry's stakeholders is the Independent T-1 Users' Association (ITUA). ITUA's objectives are to educate its members and define business applications and their telecommunications solutions. That may be the only way we can, as someone said recently, put the "S" (or sense) back into ISDN.

Mike Lefkowitz
Director of business development
ADC Telecommunications, Inc.
San Francisco

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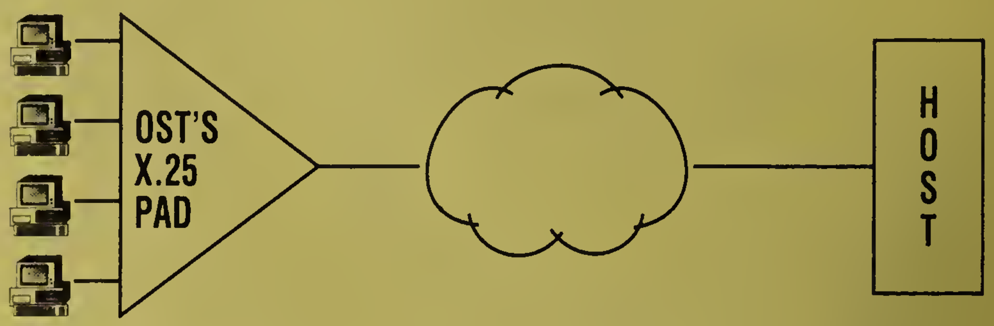

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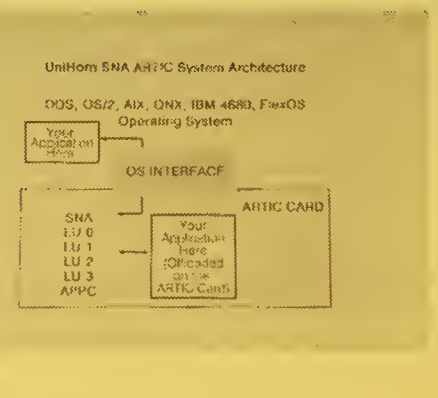
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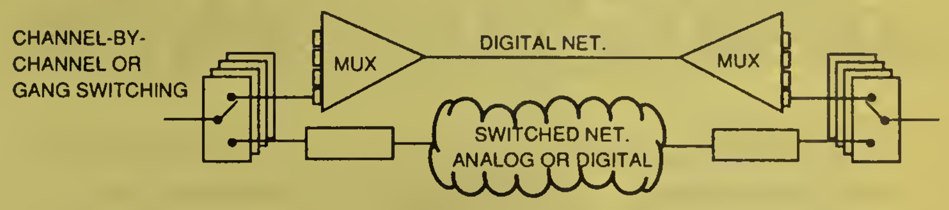

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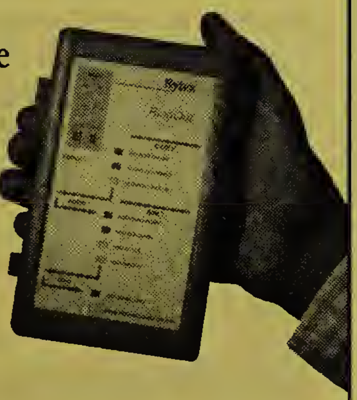

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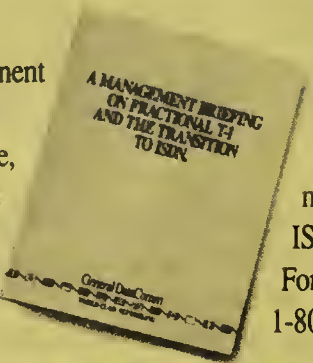
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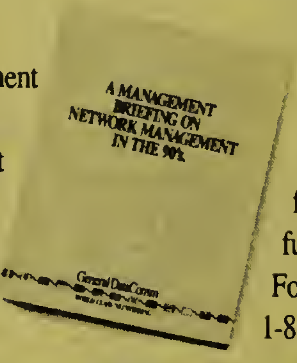

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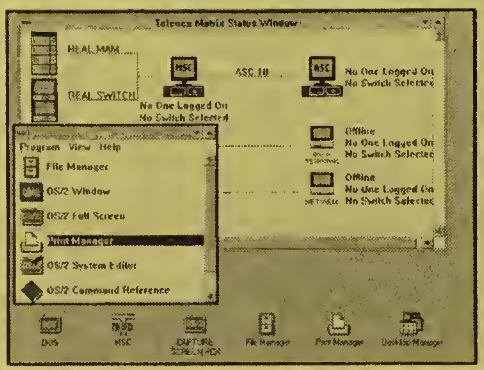

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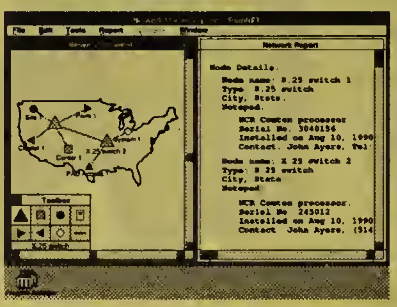

```
Node Details
  Node name: X.25 switch 1
  Type: X.25 switch
  City, State
  Notepad
     NCR Comten processor
     Serial No. 3040156
     Installed on Aug 10, 1990
     Contact: John Ayers, Tel
  Node name: X.25 switch 2
  Type: X.25 switch
  City, State
  Notepad
     NCR Comten processor
     Serial No. 245012
     Installed on Aug 10, 1990
     Contact: John Ayers, (314
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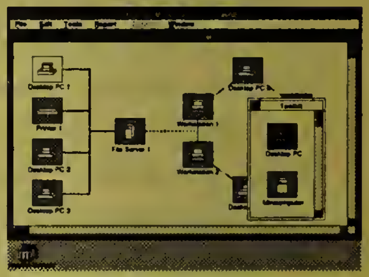

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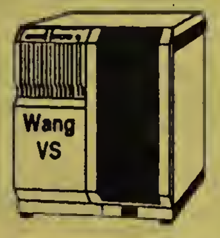

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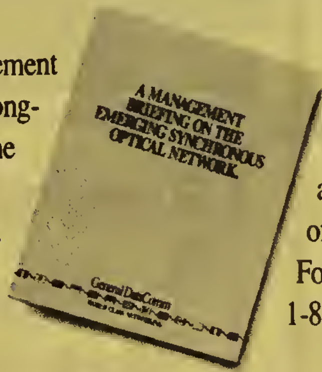
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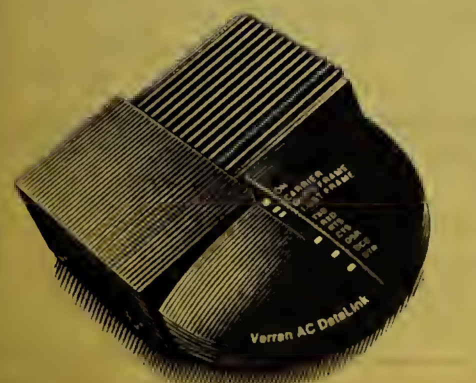

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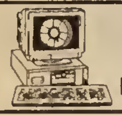
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(continued from page 34)

bridges. Unlike a GET query, SET is used by the SNMP management station to change the values of certain object variables, which are defined in the SNMP standards as read-write values. An example of a common MIB-II read-write value is the System Contact, which is typically the name and phone number of the person responsible for the system.

Few of the bridge agents we tested supported SET functionality. Two that were able to handle sets of legitimate MIB-I and MIB-II variables were 3Com and Racal InterLan. ACC and Hughes accepted sets of objects they had defined in their own MIB extensions but not the read-write objects defined in MIB-I and -II.

We configured each system strictly according to the vendor's documentation. And we believe that if we were unable to implement SET commands correctly in configuring the product, it is likely that many others will have the same problems.

Trapdoor test

Also built into the SNMP standards are a series of traps. Traps define about a half-dozen conditions; when an SNMP agent detects one, it is supposed to issue notification messages to the SNMP management station. Typically, trap alarms are issued whenever a link goes down and comes back up, and whenever the system containing the agent experiences a power interruption — whether routine (called a warm restart) or unexpected (a cold restart).

To test each agent's trap response to a cold restart, we literally pulled the plug on the bridge's power, then replugged it and watched to see what sort of trap it issued.

Only the Hughes and 3Com bridges issued cold restart traps — the Hughes bridge within about 20 seconds after power restoral, the 3Com bridge after about two minutes. The other bridges either did not issue a trap message or issued a message that neither manager was able to recognize as the expected trap.

All messages issued by each agent were carefully caught and examined on one of two HP 4972A LAN Analyzers, which was set up to filter and capture trap messages based on a user datagram protocol port number unique to trap messages.

We were also surprised by the diversity with which bridge SNMP agents count, then report, specific traffic statistics for each interface. To test the agents' packet and octet counting accuracy, we first had to eliminate all spurious packet traffic on the LAN. This was not simple because under normal operating conditions, all sorts of low-level messages constantly zip around the network. In addition, under normal operations, both HP's OpenView Network Node Manager and AT&T's Systems Manager issue all sorts of background network traffic to keep a close diagnostic watch on every network link and node.

To turn off the background traffic generated by the management stations, we disabled each of their background software routines, one at a time, and then monitored spurious packets with an HP LAN Analyzer. In addition, to the degree possible, parameters in the bridges were set to minimize any spurious packet generation — for example, by turning off or disabling the Spanning Tree Protocol. Then, to set the agents' counters with specific traffic counts, the HP LAN Analyzer issued a prestored series of 100 packets.

The 100 packets consisted of 88 normal, unicast (as opposed to broadcast) packets, ranging from minimum to maximum Ethernet packet size (64 to 1,500 bytes), and 12 packets with errors that were intentionally put in them — misaligned Frame Check Sequences.

SNMP is ambiguous regarding which traffic bridges are supposed to count. However, it is clearer where routers are concerned. Even so, the test results show that some bridges are able to provide an SNMP management station with consistent, accurate counts of packets received, while others are not (see the chart "SNMP agents

(continued on page 55)

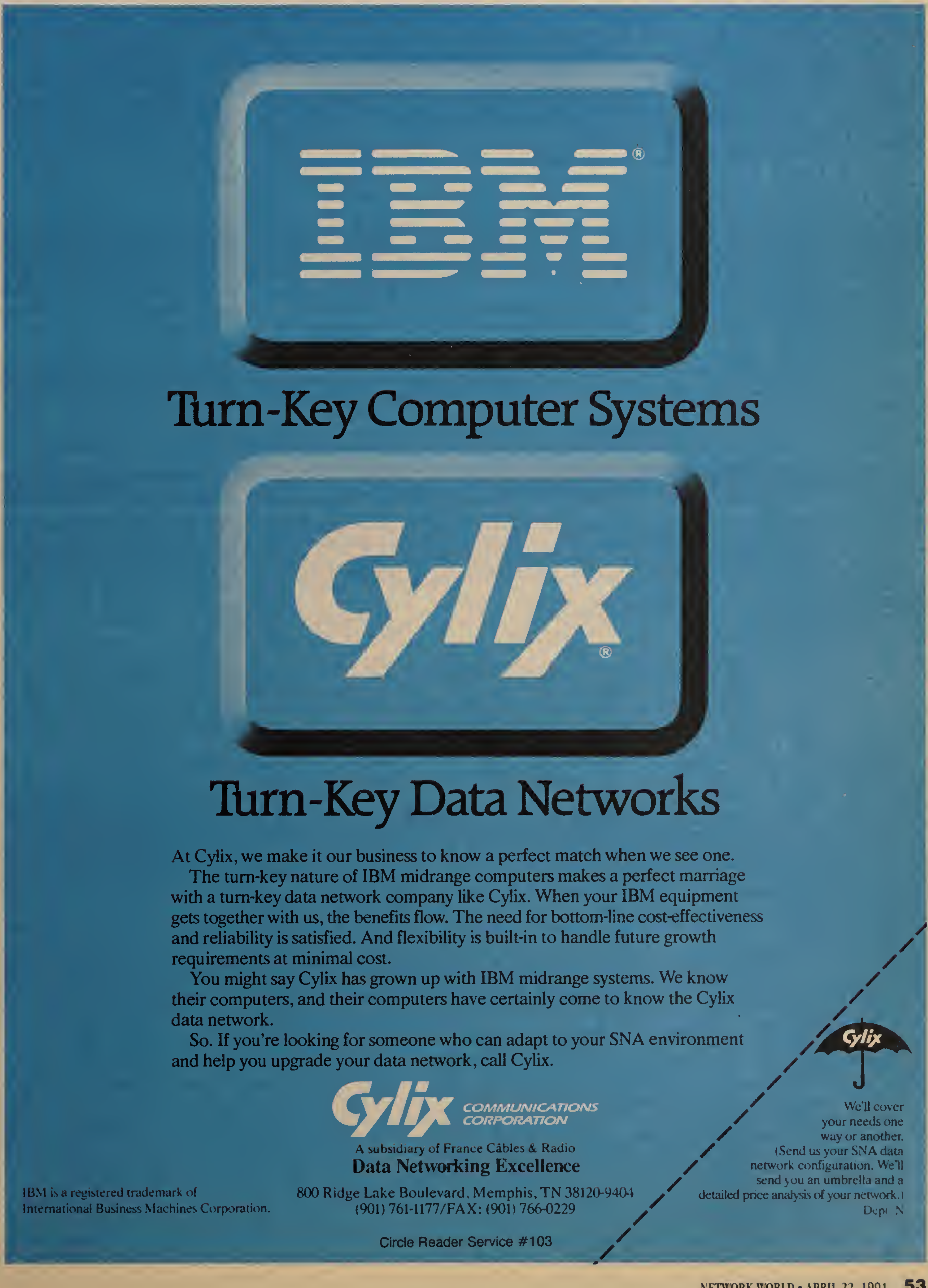
Other bridges not included in the test

In preparing for this test, we contacted every vendor of bridges that our research showed had either announced SNMP support in their products or indicated plans to support SNMP.

Some vendors declined to participate, saying that their products were not yet ready. Others refused to elaborate on why they would not participate. These nonparticipating bridge vendors include:

- Vitalink Communications Corp.: Agreed to participate but unexpectedly withdrew the day before testing began, citing its "current product situation."
- Pacific Telesis Group: Declined, citing unspecified "internal issues."
- Netronix: Declined without elaboration.
- Microcom, Inc.: Said a new SNMP agent version for its MIB was coming out this summer and did not want its current implementation tested.
- AT&T, FiberCom, Inc., Gandalf Data, Inc. and Newbridge Networks, Inc.: Stated that SNMP support would not be ready in time for our bridge test.

— *Edwin Mier*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Variance in bridges' SNMP support

Vendor	Bridge	**Management connection:** Were SNMP managers able to access bridge's SNMP agent and retrieve basic, bridge-oriented SNMP management data?	**LAN address reporting:** Could manager obtain the MAC-layer Ethernet addresses for all the bridge's LAN ports? (1)	**MIB-II support:** Did agent respond to SNMP queries from manager for objects defined in the newer MIB-II?	**Ability to set values:** Was manager able to remotely change the values of SNMP standards-specified read-write variables?	**Trap response:** Did bridge issue the appropriate SNMP alarm message in response to power interruption, as specified in standard?
Advanced Computer Communications Santa Barbara, Calif. (805) 963-9431	4140 Bridge/Router, software Version 2.6.0	Yes, once we discovered that the bridge has to be repowered to register the IP address	Yes; however, a remote bridge, with a single LAN interface (MAC address), was tested	No; responses indicated agent did not support MIB-II objects	Agent supported "set" command for vendor's private-extension MIB objects, but not MIB-I or MIB-II read-write objects	Agent issued a message, but format was not recognized as the expected "Cold-Restart" SNMP message
Alantec Fremont, Calif. (415) 770-1050	MLS-425, software Version 2.10	Yes; easily configured for SNMP management	No; agent did not respond to manager's request for LAN physical addresses	No; responses indicated agent did not support MIB-II objects	No; unable to set values of MIB and MIB-II objects tested	None within 5 min; bridge apparently loses address of manager when power is interrupted
Hughes LAN Systems Mountain View, Calif. (415) 966-7300	ProBridge 8033, current ROM pack	Yes; easily configured for SNMP management	Partially; agent responded with the same MAC address for two different LAN interfaces	Partially; agent responded to 3 of 5 MIB-II requests, but values were questionable	Agent supported "set" command for vendor's private-extension MIB objects, but not MIB-I or MIB-II read-write objects	Yes; agent issued correct Trap message within about 20 sec of power restoral
Racal InterLan, Inc. Boxborough, Mass. (508) 263-9929	INX 400/L Local Bridge, new ROM version	Yes; configuration supports only one manager address; reconfiguration required to manage address changes	Partially; agent responded with the same MAC address for two different LAN interfaces	Yes; agent responded to 4 of 5 MIB-II requests with reasonable responses	Yes, some; however, at least one read-write object was implemented as read-only	Inconclusive; not clear whether message issued by agent was the expected "Cold-Restart" SNMP message
Retix Santa Monica, Calif. (213) 399-2200	4660/S Bridge, Version 0.2 beta-test software	Yes; easily configured for SNMP management	Partially; agent responded with the same MAC address for two different LAN interfaces	No; responses indicated agent did not support MIB-II objects	No; unable to set values of MIB-I and MIB-II objects tested	None within 5 min after power interruption, restoration
3Com Corp. Santa Clara, Calif. (408) 764-5000	IB/2000 Bridge, Version 4.0 bridge software	Yes; however, command structure for configuration should be simplified	Yes; agent provided unique MAC addresses of both LAN interfaces	Yes; agent responded to all MIB-II objects queried	Yes, some; however, at least one read-write object was implemented as read-only	Yes; agent issued correct Trap message about 2 min after power restoral
Xyplex, Inc. Boxborough, Mass. (508) 264-9900	MAXserver Local Bridge	Yes, but some configuration instructions, such as setting IP address, need to be clarified	Partially; agent responded with the same MAC address for two different LAN interfaces	No; responses indicated agent did not support MIB-II objects	No; unable to set values of MIB-I and MIB-II objects tested	None within 5 min after power interruption, restoration

MAC = Media access control
MIB = Management Information Base
SNMP = Simple Network Management Protocol

(1) A single MAC address may sometimes be used for different LAN ports on the same bridge device in order to accommodate certain protocol environments. However, where the physical addresses are truly different, as our tests determined, each should have been reported by the SNMP agent.

SOURCE: MIER COMMUNICATIONS, INC., PRINCETON JUNCTION, N.J.

SNMP agents count differently

Vendor	Bridge	**Total octets received on the LAN interface (1)**	Comments	Evaluation	**Total packets received on the LAN interface (2)**	Comments	Evaluation	**Errored packets received from LAN (3)**	Comments	Evaluation	**Overall (based on total responses)**
Advanced Computer Communications Santa Barbara, Calif. (805) 963-9431	4140 Bridge/ Router	Ranged from 67,000 to 86,000	Reasonable, but different, values reported from each of 5 tests	**Fair**	100 (after deducting SNMP packets)	Agent counts SNMP packets and errored packets in total	**Excellent**	12	Agent counts and accurately reports number of errored packets received	**Excellent**	**Very good**
Alantec Fremont, Calif. (415) 770-1050	MLS-425	66,400 ± 500	Agent reported value accurately and consistently	**Excellent**	88 (after deducting SNMP packets)	Agent counts SNMP packets; does not count errored packets	**Excellent**	12	Agent counts and accurately reports number of errored packets received	**Excellent**	**Excellent**
Hughes LAN Systems Mountain View, Calif. (415) 966-7300	ProBridge 8033	64,700 ± 100	Agent reported value accurately and consistently	**Excellent**	88 (after deducting SNMP packets)	Agent counts SNMP packets; does not count errored packets	**Excellent**	12	Agent counts and accurately reports number of errored packets received	**Excellent**	**Excellent**
Racal InterLan, Inc. Boxborough, Mass. (508) 263-9929	INX 400/L Local Bridge	64,900 ± 100	Agent reported value accurately and consistently	**Excellent**	100 (after deducting SNMP packets)	Agent counts SNMP packets and errored packets in total	**Excellent**	12	Agent counts and accurately reports number of errored packets received	**Excellent**	**Excellent**
Retix Santa Monica, Calif. (213) 399-2200	4660/S Bridge	0	Agent always returns a value of 0 for this object variable	**Poor**	0	Agent counts no packets, returns a value of 0 for this object variable	**Poor**	0	Agent does not count or report errored packets	**Poor**	**Poor**
3Com Corp. Santa Clara, Calif. (408) 764-5000	IB/2000 Bridge	250 to 1,500	Agent apparently counts only SNMP packet traffic	**Poor**	0 (after deducting SNMP packets)	Agent apparently counts only SNMP packets	**Fair**	0	Agent does not count or report errored packets	**Poor**	**Poor**
Xyplex, Inc. Boxborough, Mass. (508) 264-9900	MAXserver Local Bridge	500 to 1,500	Agent apparently counts only SNMP packet traffic	**Poor**	0 (after deducting SNMP packets)	Agent apparently counts only SNMP packets	**Fair**	0	Agent does not count or report errored packets	**Poor**	**Poor**

FOOTNOTES

(1) Acceptable response: 64,000 to 68,000 octets. Based on interpretation of SNMP standards and reporting requirements by a consensus of experts. A total of 67,640 octets were sent over the LAN in the 100-packet test transmission. However, the acceptable response range takes into account SNMP packets sent to retrieve the values, which added from 500 to 1,500 octets to this count. In addition, some SNMP agents discounted 12 "errored" packets (total of 2,988 octets), which were included as part of the 100-packet test stream (see Footnote 3 below).

(2) Optimum response: 88 or 100 packets. Per SNMP standard, this is the number of packets "delivered to a higher layer protocol." Bridges could technically report 0 (except for SNMP packets, which must be included in this count), but this provides no useful SNMP management information. Errored packets, which are discarded, may legitimately be excluded.

(3) Optimum response: 12 packets. The 100-packet test transmission included 12 errored packets with misaligned Frame Check Sequences. Otherwise, these were legitimate packets.

SOURCE: MIER COMMUNICATIONS, INC., PRINCETON JUNCTION, N.J.

NETWORK WORLD

SNMP agent-manager compatibility

Vendor	Bridge	Format in which vendor-specific MIB was received (1)	Able to load on Hewlett-Packard Co. OpenView Network Node Manager 1.1+?	Was manager able to invoke/access selected private MIB objects?	Able to load on AT&T Systems Manager?	Was manager able to invoke/access selected private MIB objects?
Advanced Computer Communications Santa Barbara, Calif. (805) 963-9431	4140 Bridge/ Router	Received in format specified (1)	Yes, easily; HP system adjusted for syntax error in MIB file	Yes; objects tested worked and provided good data	Yes, after about one hour (3) but with limited capabilities	Limited; could only retrieve some object values
Alantec Fremont, Calif. (415) 770-1050	MLS-425	No private MIB submitted	NA	NA	NA	NA
Hughes LAN Systems Mountain View, Calif. (415) 966-7300	ProBridge 8033	Cassette tape; standard Unix file format; 2+ hours to convert/adapt files before either management system could read them	Unable to load or to effectively diagnose why not	Could not be determined	Yes, after 3 or more hours	Yes; objects tested worked and provided good data
Network Application Technology Campbell, Calif. (800) 543-8887	LANB/ 100M	5 1/4-inch diskette; DOS file format; 4 or more hours to convert/adapt files before either management system could read them	Yes, after 30 min; a minor syntax error was found and corrected	Could not test; unable to configure bridge or access bridge's SNMP agent (2)	Yes, after about one hour of file reformatting and syntax changes (3)	Could not test; unable to configure bridge or access bridge's SNMP agent (2)
Racal InterLan, Inc. Boxborough, Mass. (508) 263-9929	INX 400/L Local Bridge	Received in format specified (1)	Unable to load or to effectively diagnose why not	Could not be determined	Yes, after about one hour of file reformatting and syntax changes (3)	Agent returned a value of 0 for most objects tested; other values were questionable
Retix Santa Monica, Calif. (213) 399-2200	4660/S Bridge	Received in format specified (1)	Unable to load or to effectively diagnose why not	Could not be determined	Unable to load or to effectively diagnose why not	Could not be determined
3Com Corp. Santa Clara, Calif. (408) 764-5000	IB/200 Bridge	No private MIB submitted	NA	NA	NA	NA
Xyplex, Inc. Boxborough, Mass. (508) 264-9900	MAXserver Local Bridge	Received in format specified (1)	Yes, easily	Yes; objects tested worked and provided good data	Yes, after about one hour of file reformatting and syntax changes (3)	Yes; objects tested worked and provided good data

MIB = Management Information Base
NA = Not applicable
SNMP = Simple Network Management Protocol

FOOTNOTES
(1) All vendors were asked to submit their MIB extensions in standard Abstract Syntax Notation 1 on a 3 1/2-inch diskette in a standard Unix file format.
(2) While vendor's MIB could be loaded in both management systems with relatively minor syntax adjustments, no SNMP objects could be tested because the bridge, containing the SNMP agent, could not be set up and operated with SNMP agent support.
(3) Syntax changes are needed because the Systems Manager requires that MIBs be in the International Standards Organization-defined OSI Structure of Management Information Model format, which is used by OSI's Common Management Information Service Element. Most of the MIBs submitted were in the SNMP Internet SMI format.

SOURCE: MIER COMMUNICATIONS, INC., PRINCETON JUNCTION, N.J.

(continued from page 53)

count differently," page 54).

An area of SNMP management that needs considerably more work is vendors' private MIBs. As shown in the chart "SNMP agent-manager compatibility" on this page, of the six private MIBs submitted for our testing, barely half could be successfully loaded on both management systems. If the MIBs can't be loaded, the management system can still query the agent for standard MIB-I and MIB-II objects but not for any of the enhanced private MIB objects.

Part of the private-MIB problem is that vendors currently use three different formats to structure their MIBs. The most popular format today is the original SNMP MIB Structure of Management Information (RFC 1155), mentioned earlier. But this will likely soon give way to a newer Concise MIB format (RFC 1212), which is now a proposed standard and is backward-compatible with the original.

The third MIB format is the Open Systems Interconnection SMI Model. The International Standards Organization (ISO) has adopted this format for use with the Common Management Information Service Element (CMISE), which accompanies OSI's Common Management Information Protocol.

HP's OpenView Network Node Manager is oriented toward the original SNMP MIB format. However, the product can also automatically distinguish between, accept and load MIBs in the Concise format. AT&T's Systems Manager is oriented toward the OSI SMI format.

Converting an MIB from one format to another is currently a manual process that takes a person well-versed in the intricacies of MIB formats more than an hour to perform.

In that aspect, SNMP is far from simple, despite its name. Our experience in setting up for the test demonstrated that each management system applies different criteria in determining whether a vendor's private MIB is syntactically correct.

For this reason, the MIB loading process is tricky and will vary with the management system. Therefore, in our view, the responsibility for integrating vendors' private MIBs within SNMP management systems should be assumed by the management system vendor.

In this process of incorporating vendors' private MIBs, users will be faced with two different vendor approaches. Some vendors, including HP, collect and precompile vendors' private MIBs and then ship them as preloaded modules with their management system. HP already offers more than a dozen vendors' MIBs on its OpenView systems.

AT&T offers an MIB-incorporation service guarantee to customers of its network management system.

AT&T's guarantee states that it will incorporate any private MIBs the user needs into the Systems Manager at no expense to the user. The only proviso is that the private MIB vendor cooperate with AT&T in loading it and ensuring that it works.

Other bridge tests

One test we conducted is especially intriguing. It appears to debunk assertions by SNMP's critics that the inherent polling nature of this protocol places an unwieldy amount of overhead traffic on networks.

In this test, LAN network traffic was generated at various load levels to make each of the bridges as busy as possible. Then, amid the generated traffic and over the same LAN segment, a management station issued SNMP GET commands to the bridge's agent. The time it took the agent to respond was carefully measured and recorded.

The results showed that even at a sustained 50% Ethernet traffic load, no bridge agent ever took longer than 0.01 seconds to respond correctly to the manager.

In fact, the difference in SNMP response times between no LAN traffic and a 50% LAN traffic load was almost negligible. It would seem, therefore, that traffic load does not have much bearing on the management stations' capability to query bridge agents.

Which is best?

This first SNMP test has demonstrated that some bridge SNMP agent implementations perform better than others. However, better is a relative term: At times, products that did well in one area didn't do as well in another. Nevertheless, this test still uncovered some outstanding performers.

From the perspective of the products' scope of SNMP support — that is, which product provides the widest breadth and depth of SNMP support, 3Com's IB/2000 Bridge was a clear winner.

However, for accurately and consistently tracking network activity and reporting useful information to a manager, 3Com's responses left something to be desired for the set of MIB-I objects that we tested. The SNMP capabilities of the Alantec, Hughes and Racal InterLan products fared much better in this regard.

Of course, the relative performance and capabilities of a vendor's SNMP agent is not the only determining factor in selecting a bridge.

However, SNMP manageability is expected to move up several rungs in importance in the purchasing decision in the next few years — especially in organizations committed to implementing unified, centralized, standards-based net management. ◘

Need more detail on SNMP? On the results of our Bell Labs test series? Two in-depth special reports summarizing the SNMP test results are now being prepared and will be available soon. The first report is designed to provide guidance to network managers implementing enterprisewide SNMP management in a mixed-vendor network. The second report, which includes full product-by-product details and results of the entire test series, is oriented toward SNMP product developers.

For more information on either report, contact Mier Communications, Inc. at (609) 275-7311.

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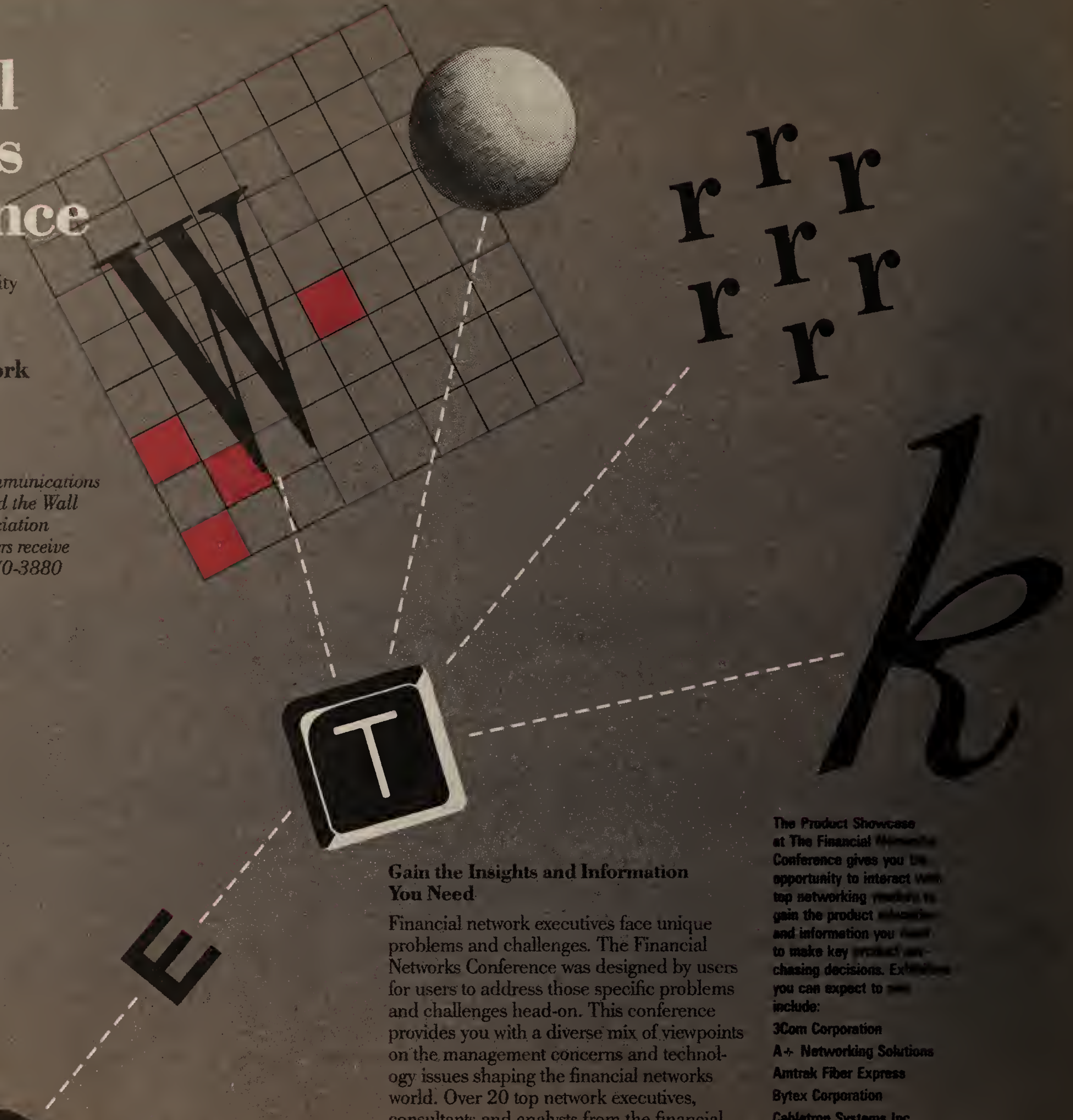
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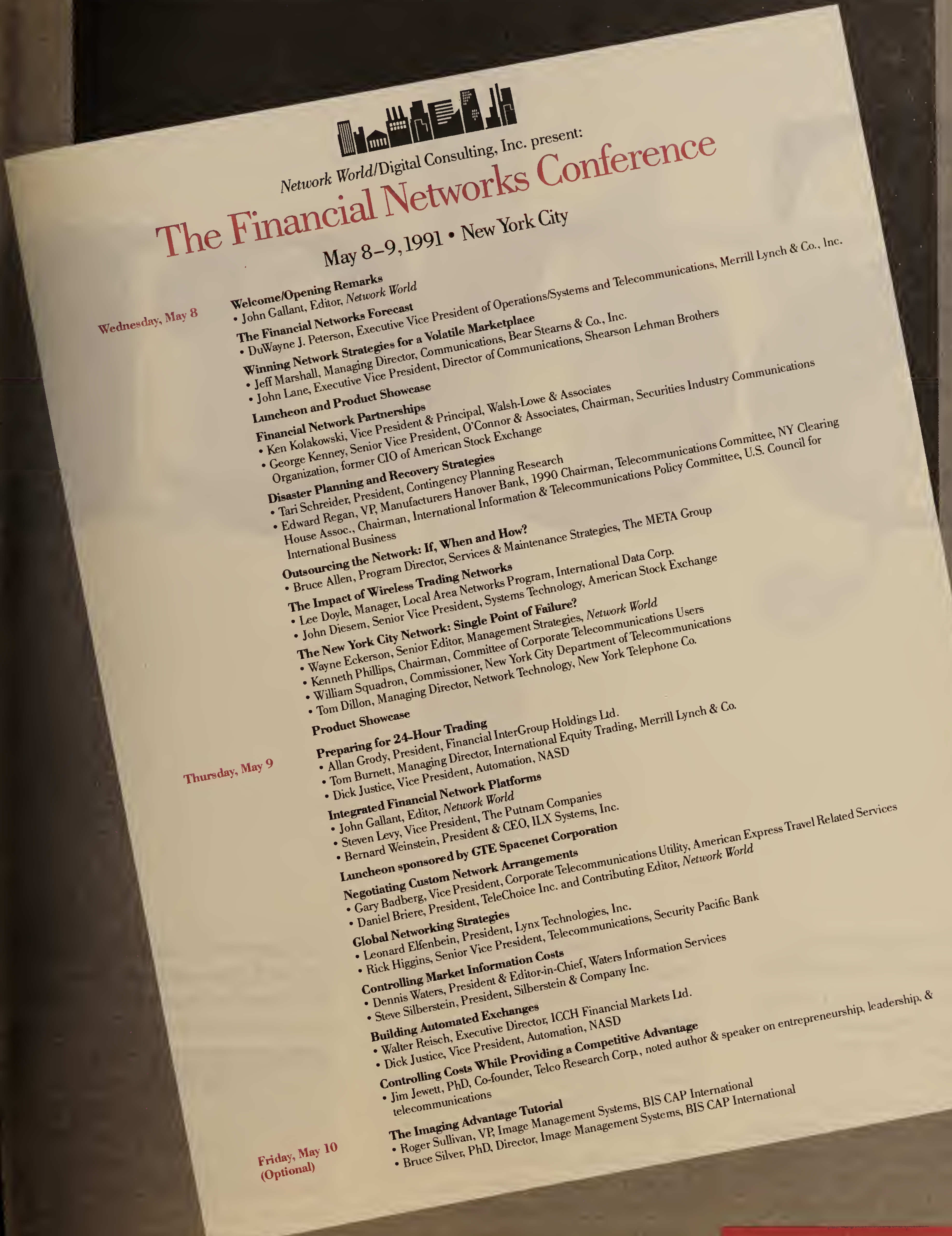

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Wednesday, May 8

Welcome/Opening Remarks
- John Gallant, Editor, *Network World*

The Financial Networks Forecast
- DuWayne J. Peterson, Executive Vice President of Operations/Systems and Telecommunications, Merrill Lynch & Co., Inc.

Winning Network Strategies for a Volatile Marketplace
- Jeff Marshall, Managing Director, Communications, Bear Stearns & Co., Inc.
- John Lane, Executive Vice President, Director of Communications, Shearson Lehman Brothers

Luncheon and Product Showcase

Financial Network Partnerships
- Ken Kolakowski, Vice President & Principal, Walsh-Lowe & Associates
- George Kenney, Senior Vice President, O'Connor & Associates, Chairman, Securities Industry Communications Organization, former CIO of American Stock Exchange

Disaster Planning and Recovery Strategies
- Tari Schreider, President, Contingency Planning Research
- Edward Regan, VP, Manufacturers Hanover Bank, 1990 Chairman, Telecommunications Committee, NY Clearing House Assoc., Chairman, International Information & Telecommunications Policy Committee, U.S. Council for International Business

Outsourcing the Network: If, When and How?
- Bruce Allen, Program Director, Services & Maintenance Strategies, The META Group

The Impact of Wireless Trading Networks
- Lee Doyle, Manager, Local Area Networks Program, International Data Corp.
- John Diesem, Senior Vice President, Systems Technology, American Stock Exchange

The New York City Network: Single Point of Failure?
- Wayne Eckerson, Senior Editor, Management Strategies, *Network World*
- Kenneth Phillips, Chairman, Committee of Corporate Telecommunications Users
- William Squadron, Commissioner, New York City Department of Telecommunications
- Tom Dillon, Managing Director, Network Technology, New York Telephone Co.

Product Showcase

Thursday, May 9

Preparing for 24-Hour Trading
- Allan Grody, President, Financial InterGroup Holdings Ltd.
- Tom Burnett, Managing Director, International Equity Trading, Merrill Lynch & Co.
- Dick Justice, Vice President, Automation, NASD

Integrated Financial Network Platforms
- John Gallant, Editor, *Network World*
- Steven Levy, Vice President, The Putnam Companies
- Bernard Weinstein, President & CEO, ILX Systems, Inc.

Luncheon sponsored by GTE Spacenet Corporation

Negotiating Custom Network Arrangements
- Gary Badberg, Vice President, Corporate Telecommunications Utility, American Express Travel Related Services
- Daniel Briere, President, TeleChoice Inc. and Contributing Editor, *Network World*

Global Networking Strategies
- Leonard Elfenbein, President, Lynx Technologies, Inc.
- Rick Higgins, Senior Vice President, Telecommunications, Security Pacific Bank

Controlling Market Information Costs
- Dennis Waters, President & Editor-in-Chief, Waters Information Services
- Steve Silberstein, President, Silberstein & Company Inc.

Building Automated Exchanges
- Walter Reisch, Executive Director, ICCH Financial Markets Ltd.
- Dick Justice, Vice President, Automation, NASD

Controlling Costs While Providing a Competitive Advantage
- Jim Jewett, PhD, Co-founder, Telco Research Corp., noted author & speaker on entrepreneurship, leadership, & telecommunications

Friday, May 10
(Optional)

The Imaging Advantage Tutorial
- Roger Sullivan, VP, Image Management Systems, BIS CAP International
- Bruce Silver, PhD, Director, Image Management Systems, BIS CAP International

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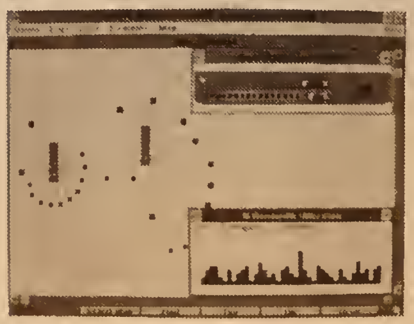

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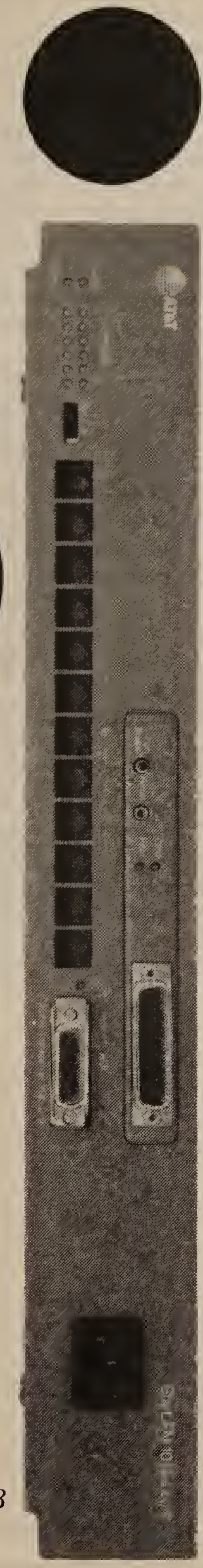
rty.

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	AT&T	Cabletron Systems	SynOptics™ Communications
Ports Locking	Yes	Yes — MMAC-3 No — MRXI-2	Yes
Intrusion Control	Yes	Yes — MMAC-3 No — MRXI-2	Yes
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AT&T
Computer Systems

SNA tool melds element manager

continued from page 1

product, although Thompson declined to name the others.

MAXM connects to an ASCII data port, such as a printer port, on attached devices or management systems, which means it will work with virtually any vendor's product, said Ronald Hardy, director of product marketing for ITM, based here.

MAXM currently supports products offered by about 35 vendors, including Larse Corp., Network Equipment Technologies, Inc., Northern Telecom, Inc., Racal-Milgo, Rolm Co. and Timeplex, Inc. ITM will add more as users require them, Hardy said.

MAXM includes two software modules, which together encompass a Management Access Point. The modules can run on the same or separate RISC System/6000s and pass data to one or more Personal System/2-based consoles running OS/2 Extended Edition (see graphic, page 1).

The first module is MAXM Server, which includes a two-way NetView service point connection based on an IBM System Services Control Point-to-Physical Unit session. A service point converts non-IBM management data into IBM formats.

There is no reason why the service point would not work with Systems Center, Inc.'s Net/Master, Thompson said, although their interoperability has not been tested.

MAXM Server also includes a rules editor, which identifies and automatically deals with incoming alarms according to programmed instructions. The product comes with generic rules that can be tailored using the menus and fill-in-the-blank screens,Thompson said.

The second RISC System/6000 module is MAXM Concentrator, which receives non-SNA messages and processes them according to the rules laid out in MAXM Server. That could mean automatically responding to error conditions or forwarding alerts to NetView.

MAXM Concentrator can be configured in a separate RISC System/6000 from the MAXM Server, which provides redundancy and lets users place concentrators closer to element managers and devices in a geographically dispersed network.

The OS/2-based console and the RISC System/6000 are configured as Systems Network Architecture PU Type 2.1 nodes and communicate with each other via LU 6.2 sessions. That standard IBM architecture separates MAXM from competitors such as AT&T's Accumaster Integrator or Nynex Corp.'s Allink and lets MAXM itself be managed by NetView, Thompson said.

ITM recommends that the console software, which is based on IBM's Presentation Manager, run on a PS/2 Model 70, which can be shared with other applications.

The console supports three windows: messages, alarm status and alarm management.

The messages window is used to send messages from one operator to another and to let MAXM itself send messages to operators.

The alarm status window displays counters for all alarms being processed. Users can customize the window, as they can any console function, for each operator. That lets users divide management of the network by line of business, region or other criteria.

The alarm management window shows all alarms the operator is allowed to view. Alarms can be prioritized by severity or arranged chronologically.

From any of the windows, a user can establish a terminal-emulation session to an attached management system or device, including as many as five 3270 sessions. That is a last resort used when automated routines have not been established to deal with a particular problem, Hardy said.

Numerous automation facilities are also provided, including a number of script files that can be kicked off from the console by choosing a function, such as "status," from a menu. Sample scripts are provided.

Users can also opt to ship most alarms to NetView to make use of its automation capabilities.

NetView/PC killer?

Analysts were split as to what the product means to the fate of NetView/PC, the chief IBM product for linking non-IBM management systems to NetView.

"I think NetView/PC is dead — completely dead — and this is just another piece of evidence in that direction," said James Herman, principal at Northeast Consulting Resources, Inc. in Boston.

But Frank Dzubeck, president of Communications Network Architects, Inc., a consultancy in Washington, D.C., said there will still be room for both products because MAXM, with an entry-level price tag of about $50,000, is aimed at higher end users. NetView/PC software costs just over $3,000, although that does not include the various third-party applications required.

MAXM supports the attachment of up to 128 management systems or devices per RICS System/6000 to NetView/PC's eight to 12. Plus, multiple RISC System/6000s can be employed, and ITM supplies all the required software so users don't have to rely on third parties.

Pricing for MAXM Management Access Point software starts at $50,000, and workstation software pricing starts at $10,000. Pricing for an entire system can cost up to $150,000.

NCUG urges support of caller ID

continued from page 2

could mean an end to lobbying with each state's PUC to approve plans to offer the service," said Daniel Gonos, telecommunications manager for Domino's Pizza, Inc. here.

Caller ID services have touched off a bitter public debate between some who say privacy rights may be violated and others who view the new technology as a tool to help screen threatening or harassing calls.

Caller ID update

Ameritech
Does not offer caller ID.

Bell Atlantic Corp.
Suspended caller ID in Pennsylvania; offers caller ID with blocking in Washington, D.C. and caller ID without blocking in Maryland, New Jersey, Virginia and West Virginia.

BellSouth Corp.
Offers caller ID in Tennessee.

Nynex Corp.
Offers caller ID in Vermont.

Pacific Telesis Group
Offers caller ID with blocking in Los Angeles and San Francisco.

Southwestern Bell Corp.
Does not offer caller ID.

US West, Inc.
Does not offer caller ID.

SOURCE: REGIONAL BELL HOLDING COMPANIES
GRAPHIC BY SUSAN SLATER

Corporate users are caught in the middle, saying they understand privacy concerns but want to be able to develop new business applications based on the forwarding of callers' numbers.

Gonos has testified in favor of the service at PUC caller ID hearings across the nation with some success. Domino's operates stores nationwide and uses caller ID at its stores in New Jersey, where the service is already available without blocking. Two Domino's stores in New Jersey have realized a 90% decrease in undeliverable orders in the first six months they used caller ID.

Bob Bursick, telecommunications director for Wayne State University in Detroit, said he would like to see Congress adopt a national policy, rather than leave the decision for Michigan politicians and state regulators.

"I have a little more confidence in [Congress'] ability to insulate caller ID from politics in Washington, D.C. than I do in Michigan," Bursick said.

There are currently only two pieces of pro-caller ID legislation. A bill proposed by Sen. Herbert Kohl (D-Wis.) in January would legalize caller ID services nationwide if passed, but it would also require call blocking.

Rep. Edward Markey (D-Mass.), chairman of the House Telecommunications and Finance subcommittee, last month introduced the "Telephone Consumer Privacy Rights Act" bill, which would prohibit firms with automatic number identification services from using the information collected for anything other than internal use without customer consent. The bill would require that callers be given the opportunity to block the transmission of their phone number free of charge.

Although NCUG is generally pleased with the Kohl bill, the group's caller ID position paper opposes blanket provisioning of call blocking, preferring to provide it only to emergency groups.

Telephone companies and users say call blocking devalues caller ID service.

In the absence of a national pro-caller ID policy, Gonos will continue to extoll the virtues of the service to state regulators. "We'll seize every possible opportunity to testify and make our case for caller ID," he said.

US Sprint trails AT&T in backup

continued from page 25

than all existing transpacific fiber and satellite facilities combined.

Haw-4/TPC-3 and TAT-8 run at 560M bit/sec. TPC-4, TAT-9, TAT-10 and TAT-11 will run at 1.12G bit/sec. TAT-12 will be a 2.4G or 4.8G bit/sec cable system, Fahey said.

Currently, the only fiber-to-fiber restoration available for international cables serving the U.S. is provided via a ring of international fiber cables in the South Pacific (see graphic, page 25).

Lagging behind

US Sprint is not currently planning to offer any automatic fiber-to-fiber restoration services for its international fiber cables, a company spokesman said.

This is because the two major fiber cables US Sprint is relying on to provide international services — the North Pacific Cable (NPC) and the Private Trans-Atlantic Telecommunications (PTAT) cable — were built by companies operating independently of the major carriers that dominate or monopolize domestic and international markets.

Since the independent companies running NPC and PTAT currently have no plans to build redundant fiber cable systems, US Sprint will have to rely on satellite restoration for those two cables for the foreseeable future.

US Sprint benefits from AT&T's fiber redundancy efforts because US Sprint is purchasing capacity on AT&T's fiber cables and using it to provide services.

But the lack of fiber redundancy for PTAT and NPC also hurts US Sprint because these are US Sprint's primary facilities for its international network services.

Group to spur net applications

continued from page 24

meeting next month, we'll discuss in more depth how we're going to proceed.

What are some of the issues you'll raise with vendors first?

From talking among ourselves, we've learned that there are too many vendors writing applications for simple LANs. They believe the application would be sufficient for a wide-area network.

So it will be an educational process of learning what works across real-life wide-area networks.

In my test lab alone at PG&E, I have 30 servers, which is more servers than the average small software vendor has in their entire company.

I've had several vendors come in to demonstrate applications in our test facilities. It's in partnerships like these that we can help to improve a product.

Also, when users talk about wanting applications that effectively run across a wide-area net, we don't just mean worrying about the size of the lines. We also mean integration into the network operating system, too. It's amazing the number of products that come with their own naming and security schemes because there aren't any standards out there today.

If you're a user in an environment like mine, you're not going to learn a different naming scheme, a different name and address book, and [a] different security scheme for every package. You just want to use it.

Basically, our group is going to work to make these sort of things happen.

Debate heats up over local access

continued from page 12

notice of proposed rule making that would outline a local access rate plan to be implemented within a year. Many observers think the FCC will make a decision in July, the same month in which the local carrier price caps go into effect.

According to some industry observers, the transport charge proceedings could become one of the year's hottest telecommunications issues.

"The amount of money involved is so large and the potential impact on the companies and end users alike so great that the proceeding is expected to generate significant controversy," said John Bain, a telecommunications analyst at Raymond James & Associates, Inc., a St. Petersburg, Fla., market research firm.

AT&T unifies line via software

continued from page 1

System 75 and System 85 from a hardware standpoint," said Mark Koenig, AT&T's Definity product manager. "Now we're planning the same for the switch operating software."

A single software base for the Definity line will enable AT&T to support all existing features on both switches and develop enhancements for both PBXs at one time.

"We'll be able to be more responsive to customer needs by more quickly and easily rolling out new features," Koenig said. "And we will realize cost efficiencies internally by only developing them once."

The Definity Generic 1 supports 100 to 1,600 lines, while the Generic 2 can support as many as 30,000 lines.

Definity users were pleased to hear of AT&T's intentions.

"It'd certainly be a great benefit to have Generic 2 features [supported] on the Generic 1," said Andrew Recito, a telecommunications specialist with Textron, Inc. in Providence, R.I.

"Before the Definity came along, when we needed a [midsize] PBX with advanced networking features, we bought System 85s even though the number of lines we had could have been handled by the smaller System 75," Recito said. Textron currently has six Generic 1s, 28 System 75s and nine System 85s.

Analysts also applauded the news.

"The Definity PBXs are related switches but do not constitute a common product line," said Ian Angus, president of Angus Tele-Management Group, Inc., a consultancy in Pickering, Ontario. "The software will enable AT&T to make features common and help draw the Definitys together to eventually form a single platform."

Users have pressed AT&T to offer Definity Generic 1 features — including six-party conferencing, an integrated directory and a hospitality package — on the Generic 2, while asking for Definity Generic 2 features including Look Ahead Interflow, Call Vectoring and support for Integrated Services Digital Network Basic Rate Interface on the Generic 1, Koenig said.

Look Ahead Interflow is an automatic call distributor (ACD) feature that enables users to distribute calls to agents at multiple sites.

If all agents are busy, the PBX sends a message over an ISDN Primary Rate Interface D Channel link to an AT&T PBX at a second site. If agents at the second site are busy, the call is held in the queue where it was originally received.

> "We'll be able to be more responsive by more quickly rolling out features," Koenig said.
>
> ▲▲▲

Call Vectoring enables a switch to determine to which agent group or location an incoming call should be sent based on vector tables and parameters such as time, date, number of calls in queue, number of available agents and time in queue of the oldest call.

Generic 1 users will also get the Generic 2's advanced ISDN signaling features including Non-Facility Associated Signaling, which allows one 64K bit/sec D channel to handle signaling for as many as 21 PRI links, and D Channel Backup, which protects against loss of the signaling channel.

Generic 2 users will receive Generic 1 features, including an integrated ACD management software package dubbed Basic Call Management System. That package collects and presents call center operation and performance statistics.

Today, the same package for the Generic 2 must be run on an AT&T 3B2 adjunct computer.

The common software could provide additional benefits to Definity users. Because features supported by both switches are often activated and maintained differently, users may be able to reduce training and operational costs, Koenig said.

Edward Fontenot, technology and operations vice-president for Rockefeller Group Telecommunications Services, Inc. and former president of the System 85 Users Group, said employees who travel or are reassigned from Generic 1 sites to areas served by a Generic 2 will not have to be retrained on feature usage.

"We don't want [end users] to have to remember one set of procedures for using Generic 1 features and a second for Generic 2," Fontenot said. "The same benefits will apply to maintenance as well."

RISC processor option

In addition to rolling out common switch software for its two main switches, AT&T plans to offer a RISC processor as an option for the Definity line that will significantly increase the call processing power of the switches.

The Generic 2, which currently handles 62,000 busy-hour call attempts with its AT&T 501CC main processor, will be able to handle about 124,000 call attempts with the RISC processor, according to Koenig.

"They can stay with their existing processor and go to new features based on the common software, or they can migrate from their existing processor to the RISC [processor]," he added.

AT&T declined to divulge the cost of upgrading to the RISC processor.

AT&T raises prices for PBXs, phones

BRIDGEWATER, N.J. — AT&T last week announced price increases averaging 5% for its digital private branch exchanges and selected telephones.

Mark Koenig, Definity product manager for AT&T, cited inflation and increased materials and labor costs as reasons for the hike, AT&T's first switch price increase since 1986.

AT&T raised by 5% the price of its low-end Definity Generic 1, System 75 and System 85 PBXs; boosted by 5% to 8% the price of the high-end Definity Generic 2 PBX; and increased by as much as to 10% the price of its 7000 series telephones.

AT&T PBX users had mixed feelings about the change.

Being the "first increase in five years, it is difficult to get [upset] about the change," said Edward Fontenot, technology and operations vice-president for Rockefeller Group Telecommunications Services, Inc. and former president of the System 85 Users Group.

Gene Webb, president of the Definity/85 Users Group and assistant director of information and communications services for the city of St. Petersburg, Fla., said the increases were inevitable. "With the consumer price index increasing by about 5% a year, it's not realistic to expect AT&T to maintain a flat pricing structure."

A telecommunications manager for a Midwestern food company who requested anonymity was less understanding. "It doesn't make sense to raise prices with the PBX industry in such tough shape. The move is bordering on brazen."

AT&T PBX-related products unaffected by the price increases include AT&T's Audio Information Exchange and VoicePower voice mail systems, the Conversant Voice Information System voice response unit and adjunct-based call management systems.

— *Bob Wallace*

IBM fires up with new OS/2

continued from page 6

IBM's Communications Manager, which handles asynchronous communications for OS/2 systems. IBM's Communications Manager and Database Manager will be given access to NetWare servers as well.

"We will ensure the interoperability of [IBM's] LAN Server and NetWare over time, and both will be enhanced over time," Guglielmi added.

In another move, IBM renewed its vow to make LAN Server functionally equivalent to LAN Manager 2.0.

IBM described plans in a white paper to make its DOS LAN Requester more compatible with Windows 3.0. The improvements include allowing users to log on and off the network from within Windows and to have resources automatically assigned to Windows users when they log on.

In addition, elements of the Open Software Foundation's (OSF) Distributed Computing Environment, including the remote procedure call and distributed naming service, will be extended to OS/2, Guglielmi said. That development is not expected to be completed before 1993.

IBM demonstrated the NetWare Requester for OS/2 Versions 1.3 and 2.0 at the briefings. That software allows OS/2 machines to act as client systems on NetWare networks.

DEC lets VAX support voice

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plug into a Q-bus slot on a MicroVAX 3000 or VAX 4000.

The DECvoice T-1 Telephony board enables users to terminate as many as three carrier T-1 links directly into a VAX. The T-1 interface demultiplexes the T-1 signals into a maximum of 72 calls and distributes them across the Q-bus to Multiline DECvoice boards, each of which can support as many as eight calls.

The DECvoice boards use adaptive differential pulse code modulation to compress incoming 64K bit/sec voice signals to 24K or 32K bit/sec and sends them as RMS files to a VAX data base for storage. Additionally, it supports a speech recognition capability as well as a text-to-speech function, which makes it possible to read text files to a caller.

The Multiline DECvoice board is an improvement over the company's DECvoice board released in 1988. That board came equipped with an RJ-11 interface and supported a single incoming call.

A package comprising a single DECvoice T-1 Telephony board and a single DECvoice board for Q-bus VAXes costs $9,410. Additional DECvoice boards cost $4,653 each. Both are available now.

Soft side

While DEC designed the hardware that converts VAXes into voice processors, it is relying on third-party vendors to provide the software. The key application is VOICEsoft Corp.'s VOICEmail, which enables a VAX to support all the functions of a traditional voice mail system.

Developed under the direction of former Genesis Electronics Corp. executives in Rocklin, Calif., VOICEmail will be added to the communications component of DEC's All-In-1 Phase II office automation product.

This will enable All-In-1 Phase II users to exchange voice mail messages in addition to electronic mail. It will also enable users to append a voice message to a spreadsheet by using All-In-1 Phase II's decision support tools.

VOICEmail includes VOICEapi, a VOICEsoft application program interface that enables developers to build links from existing applications to the voice mail system. This feature is being beta-tested by the Veterinary Medical Teaching Hospital of the University of California, Davis.

The school last week installed a VAX running VOICEmail and will use the VOICEapi to pass commands from an admission application running on a local-area network-attached microcomputer to the VAX running VOICEmail. The LAN utilizes DEC's server-based Pathworks software as a gateway to the VAX.

"We are really fledgling in this thing," said Paul Brentson, the hospital's administrator. "It is all very new to us."

Brentson explained that when an animal is admitted, the hospital wants to establish automatically a voice mailbox that will enable veterinarians to record updates on the animal's condition that the pet's owner can retrieve. This will be accomplished by using VOICEapi to pass the administrative commands needed to establish the voice mailbox from the admitting application running under MUMPS to VOICEmail. The voice mailbox can be deactivated by commands passed via VOICEapi from a discharge application running on the LAN to the VAX.

The first release of VOICEmail is expected to ship in June and will cost between $10,000 and $180,000, depending on whether users upgrade existing VAXes by purchasing boards and software or buying a VAX preconfigured with the boards and software. A second release of VOICEmail, which is due out in 1992, will take advantage of DEC's Mailbus and DECnet to send voice files between VAXes, thus enabling users to build a voice mail network.

Process redesign increases return

continued from page 1

Many are threatened by change and will resist it. Companies must also modify reporting structures, performance measurements, reward systems and training to get the most out of new information systems (IS) initiatives.

One company that is committed to business process redesign is Continental Bank in Chicago. The bank has established a formal methodology for reshaping business processes that has been applied to every facet of the business, including IS (see "IT group banks on VISTA to serve end users better," this page).

The methodology calls for specially trained IS staffers to work with teams of businesspeople who are investigating ways to transform existing processes to make the bank more responsive to customer needs.

The IS staffers, known as process data modelers, do not lead the teams' meetings; they simply try to ensure that the team follows a predetermined business redesign methodology (see graphic, this page). They also ensure that the group's efforts remain consistent with the company's overall objectives and systems architecture while not conflicting or overlapping with work being done by other redesign groups, said Dick Gittin, managing director of infrastructure services at Continental.

> "People in [the information technology department] play a critical role in business redesign because they are the only ones whose jobs look across the whole company."
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"People in [the information technology department] play a critical role in business redesign because they are the only ones whose jobs look across the whole company," he said. "They also understand how technology can be used to support and transform business processes."

But the IS facilitators are told not to discuss technology in the early stages of the redesign work. "You don't want technology to drive the process," Gittin said. "You have to let the businesspeople determine what works best for the organization and then show them how technology could support their designs."

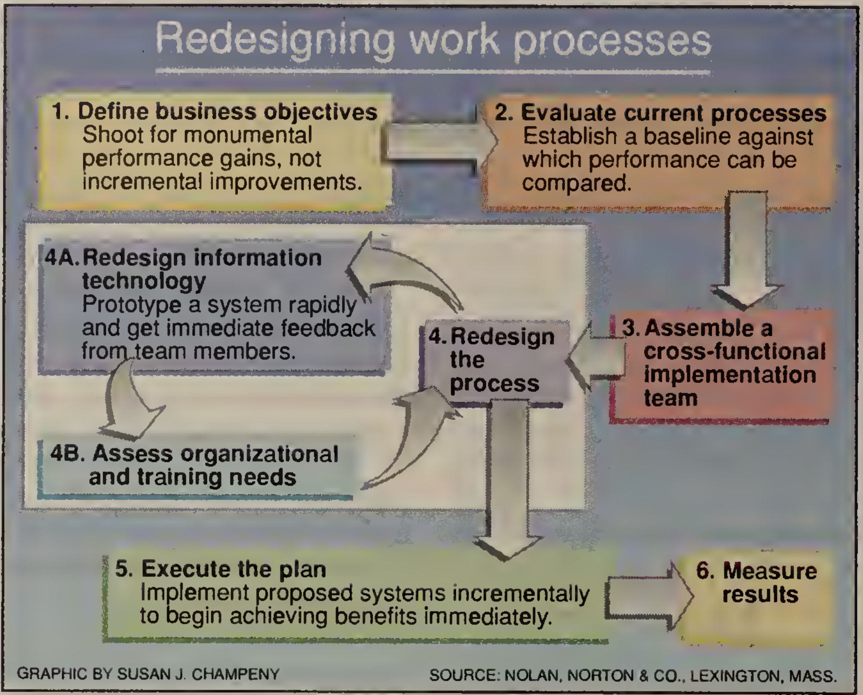
Fannie Mae trims down

Federal National Mortgage Association (Fannie Mae) is currently redesigning the processes by which it buys mortgages from commercial banks and sells them in the form of mortgage-backed securities worth hundreds of millions of dollars to institutional investors on Wall Street.

According to Andrew Weiss, vice-president of business process redesign at Fannie Mae, the firm wants to reduce the time it takes to complete transactions with lenders from three weeks to three days. It also wants to develop products faster, enhance risk management capabilities and improve the quality of data.

Weiss said the business redesign effort was triggered primarily by the advent of new technologies, such as local-area networks and workstations, that were causing IS to reconsider how it delivered information to end users.

"The use of LANs and custom data bases, particularly in regional offices, were giving people access to information that enabled them to make better decisions. For IS, this turned the whole process of delivering technology on its head," Weiss said.


Redesigning work processes
1. Define business objectives
Shoot for monumental performance gains, not incremental improvements.
2. Evaluate current processes
Establish a baseline against which performance can be compared.
3. Assemble a cross-functional implementation team
4. Redesign the process
4A. Redesign information technology
Prototype a system rapidly and get immediate feedback from team members.
4B. Assess organizational and training needs
5. Execute the plan
Implement proposed systems incrementally to begin achieving benefits immediately.
6. Measure results

GRAPHIC BY SUSAN J. CHAMPENY

SOURCE: NOLAN, NORTON & CO., LEXINGTON, MASS.

As Fannie Mae's management began to look more closely at the way IS delivers information, they realized the source of the problem was not just the systems, but the business processes around which the systems were built.

The company realized that to close $500 million deals in three days instead of three weeks, it needed to streamline the dealmaking process. This entailed improving coordination between departments and consolidating steps in preparing contracts.

To facilitate this process, Fannie Mae established cross-functional teams to streamline the process of preparing a contract and work closely with IS to develop systems that would support the new process, Weiss said.

"It's critical for business and IS people to form a close partnership if the redesign is to work," Weiss said.

However, keeping up with the business changes has not been easy for everyone, Weiss said. Some people, including a few senior IS managers, have left the firm or were forced out because they were unwilling to make the change from a mainframe-based world to a distributed one.

"If you make radical business changes and hand them to an IS shop that thinks very traditionally and is risk-adverse, you will run into problems."

Fannie Mae has actively recruited college graduates and trained them to be programmers and technologists who are comfortable working in a distributed LAN environment.

Weiss said the fear of change can often hinder the redesign process. Many people are afraid their jobs will be eliminated or their skills will no longer be suited to the new environment.

It's critical to allay workers' fears because the transition to a new operating environment can take several years or more, he said. These workers will be needed to support existing systems. At the same time, they can be taught skills to make it possible for them to succeed in the new environment.

Features Writer Salvatore Salamone contributed to this article.

IT group banks on VISTA to serve end users better

Members of the information technology (IT) group at Continental Bank Corp. have taken business process redesign to heart.

On the brink of bankruptcy in the late 1980s, Continental Bank radically changed its business strategy.

The bank shifted away from serving retail and commercial customers to concentrate on large corporations, institutional investors and high-income individuals.

For the bank's IT group, that meant an equally radical change: To support the bank's new strategic direction, the group moved from a centralized, mainframe-based approach to a distributed one based on workstations and local-area networks.

The move to distributed computing enabled the IT group to develop applications more quickly to meet business unit needs and to help the bank improve customer service.

With those goals in mind, the IT group formed a business process redesign team to overhaul its old operating procedures, practices and systems setup.

The team defined a new vision for the IT group, in addition to a set of guiding values and principles, a flexible organizational structure, performance standards and reward systems, and a systems and network architecture designed to make IT more responsive to end-user needs.

The architecture, dubbed Vision for Information Systems Technology Architecture (VISTA), specifies an IT infrastructure consisting of a global backbone network, relational data bases and reusable application code.

All applications are now developed using the common tools and components specified in the architecture, which simplifies and expedites the application development process.

The new architecture, along with redesigned organizational processes and principles, enables the IT group to deliver new applications to business units in less time, according to Ruth Moderson, managing director of the IT group.

For example, IT recently developed an advanced application for a business unit in two months that previously could have taken two years or more.

"The business unit was so excited that they threw a party for us," Moderson said.

— *Wayne Eckerson*

3Com packs let PCs access OSI

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vendor-specific local-area network traffic such as that using Microsoft Corp.'s LAN Manager utilize OSI wide-area networks for transport. The product is software installed on both the client and server that, when loaded, provides support for the OSI Transport Protocol Class 4 connectionless-mode Network Service (TP4/CLNS), Smith said.

Homogenizing the net

"[Novell, Inc.'s] NetWare uses IPX to transmit data," he said. "LAN Manager's IPX is [IBM's NETBIOS Extended User Interface]." But both are proprietary and cannot be integrated with other traffic on OSI-based backbones.

"OSI InternetBIOS creates an internetworking platform for LAN Manager" and other platforms by using OSI protocols, Smith said. "This is a way to homogenize the network by running only one protocol."

The third offering, TCP/IP and OSI Connection Service software, lets terminal and personal computer users attached to 3Com's CS/2000 and CS/2100 terminal servers access hosts running TCP/IP and OSI proto-

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cols. The software enables the servers to support the OSI Virtual Terminal Protocol for terminal sessions with OSI-based hosts.

Terminals attached to these servers can access any vendors's host as long as it is running OSI protocols.

The software also supports FTAM for file transfer among multiple OSI hosts and TCP/IP's Simple Network Management Protocol (SNMP), which will let the terminal servers be controlled by any standard SNMP-based management system.

However, as with the OSI/ES with DPA product, communications with the host is not interactive because only the initiator is provided.

Some sources questioned the genesis of the new products, given 3Com's "exit" from the software business late last year.

According to Smith, the company's goal then was not to leave the software market altogether.

"We got out of the work group computing business," he said. "[OSI/ES with DPA] is a basic connectivity product, not a work group solution. And [with OSI InternetBIOS], our customers have come asking for end system products."

Since 3Com already provided internetworking products in its NetBuilder family, Smith said the company thought that line was as good a candidate as any to provide internetworking software for end users.

3Com OSI/ES with DPA costs $650 for a single-user license, $2,495 for a 10-user license and $4,995 for a 30-user license. 3Com OSI InternetBIOS costs $1,295 for a server license.

Both products are currently available.

Concurrent TCP/IP and OSI Connection Service software for CS/2000 and CS/2100 terminal servers is expected to be available in June for $750 per server.

Some sources questioned the new products, given 3Com's "exit" from the software business.

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Bill to let gov't decode messages

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could open up a Pandora's box of problems and would render encryption ineffective as a security tool.

"It would severly limit the usefulness of encryption," said Eddie Zeitler, vice-president for information security services at Fidelity Investments in Boston. "Over time, you would no longer know who has the trapdoor or keys. Security could not be assured."

Part of terrorism bill

The provision is contained in a counterterrorism bill introduced by Sen. Joseph Biden, (D-Del.) in January. It reads:

"It is the sense of Congress that providers of electronic communications services and manufacturers of electronic communications service equipment shall ensure that communications systems permit the government to obtain the plain text contents of voice, data and other communications when appropriately authorized by law."

As currently phrased, the provision is not legally binding and is roughly equivalent to a resolution, but makers of encryption equipment may feel obligated to comply with it anyway, said D. James Bidzos, president of RSA Data Security, Inc., a major supplier of encryption and data authentication systems.

Bidzos said vendors may worry that the provision will become law in the near future and could begin working today to comply with it.

Even if the provision is not approved, it will probably be followed up in the next five to 10 years with a series of laws that makes its terms legally binding, said Willis Ware, chairman of the Computer Systems Security and Privacy Advisory Board, a 12-member committee that advises the government on computer security issues.

Vague text

Security experts noted that the provision is very vague and it is unclear how the government would obtain "plain text contents" of communications.

But Bidzos said he thought the most likely means for accomplishing this would be for makers of encryption systems to design electronic master keys that let the government decode encrypted communications. Alternatively, he said trapdoors — confidential passwords or other codes — could be developed to serve the same end.

But because master keys and trapdoors would be known by vendors and government officials, instead of just the user, keeping them secret would be very difficult.

Features Writer Sal Salamone contributed to this article.

AT&T offers int'l discounts

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they probably will respond to the AT&T promotion — some by offering new discounts and others by extending existing ones.

Half price to Asia

According to Drew McCahill, AT&T's product marketing manager for international dedicated services, the carrier is offering discounts of 25% to 35% for most digital and analog international private-line services.

All analog and digital private-line service to Europe, for example, is discounted 25%, except for fiber-optic T-1 circuits, which AT&T is discounting by 35%. For digital, fiber-optic private lines to Asia, AT&T is offering a 50% discount for the first circuit ordered and a 35% discount for the next circuit. After the first two circuits, discounts alternate between 50% and 35% per circuit.

All the discounts AT&T is offering will be applied to monthly circuit charges for one year after the circuit is provisioned.

McCahill said this is AT&T's fourth international private-line promotion since 1989, including a promotional discount of 16% to 25% for international analog circuits in 1989, and promotional discounts of 16% to 25% for digital and analog international private lines AT&T offered twice last year.

McCahill said AT&T is running the current discount in an effort to increase sales during the busiest period for ordering international private lines. But some of AT&T's competitors said the carrier is trying to use deep pockets to increase market share and possibly drive smaller competitors out of business.

"AT&T wants to make it difficult for the competition to survive," Mancuso said. "They most definitely are trying to increase [their] private-line market share."

Mancuso said TRT/FTC is now offering promotional discounts of 20% to 25% for international private lines ordered by June 30. He said the discounts may run longer in response to AT&T's promotion.

Michael Sauer, New York-area sales manager for WorldCom, said his company last week announced discounts of 67% for the first month and 34% for the second month for each international circuit a user orders before the end of June. Sauer said WorldCom may extend the promotion if it proves successful.

Officials at TRT/FTC and WorldCom said the new discounts can be coupled with volume discounts users receive for custom network deals.

International private-line product managers at IDB Communications and MCI said they will respond to the AT&T promotion but have not yet decided how. US Sprint Communications Co. has not filed any tariffs for international private-line discounts, according to a spokesman.

High margins

Even though some carriers said the promotions are hurting already slim profit margins, users and consultants expressed little sympathy. This is because international private-line services are far more expensive than domestic private-line services, and many observers said the price cutting is merely bringing international private-line charges more in line with provisioning costs.

"I think international private-line services continue to be profitable," said Mark Lowenstein, senior analyst at The Yankee Group in Boston. "Even with these discount options, the margins are still higher than in the domestic area."

GSA owns up to irregular deals

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tant to the comptroller general in the General Accounting Office, testified that the failure of GSA to enforce the contractually mandated price caps on the vendors led to the memo of understanding with US Sprint.

Socolar said the memo also contained a clause in which the GSA waived its right to enforce the price caps until the end of the contract's fourth year, giving up any chance of collecting possible overcharges from Dec. 8, 1988, to Dec. 7, 1992.

Socolar estimated that US Sprint alone could be liable for $11 million in overcharges.

He said that reassigning the Navy portion of the contract to US Sprint did nothing to correct the imbalance in the vendors' targeted 60-to-40 revenue split mandated by Congress.

AT&T, the lowest bidder in the FTS 2000 procurement, is supposed to receive 60% of revenues from the procurement, and US Sprint is supposed to receive 40%. However, in fiscal year 1990, AT&T held a 42% share, while US Sprint held 58%.

GSA Administrator Richard Austin conceded that GSA's original traffic figures had been poorly calculated and vowed to reach the correct 60-to-40 split by October 1991.

Rep. Jack Brooks (D-Texas), who was chiefly responsible for making FTS 2000 a two-vendor contract, also testified at the hearing, saying, "We're right back where we started. Suspicion and intrigue seem to be ruling again."

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